

1981

DISCUSSION PAPER

STEEL INDUSTRY IN ONTARIO
1981

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DISCUSSION PAPER

STEEL INDUSTRY IN ONTARIO
1981



Economic Development Branch
Office of Economic Policy
Ministry of Treasury and Economics
October 1981



EXECUTIVE SUMMARY

Importance to Ontario

- o Three large steel companies produce about 70 percent of total Canadian steel production and 92 percent of total Ontario steel production. They are Algoma in Sault Ste. Marie, Dofasco in Hamilton, and Stelco in Hamilton and near Nanticoke.
- o Four mini steel mills produce about 8 percent of Ontario's total steel output. These mills are located in Welland, Hamilton, Whitby and L'Original.
- o Iron and steel mills directly employ over 50,000, of which about 12,000 are in Sault Ste. Marie, about 30,000 are in Hamilton, 3,800 are in Welland and 1,400 are in Nanticoke.
- o Iron and steel mills, as an industry (SIC 291), are the largest single employer in Central Ontario.
- o Overall, direct employment in the iron and steel industry (which includes iron and steel mills, pipe and tube mills and iron foundries) is 61,500. Central Ontario employment is 45,500 while Northern Ontario employment is 13,000.
- o Capital and repair expenditures by the iron and steel mills for 1981 are expected to be \$1.5 billion.

The Big Three Steel Mills - Algoma, Dofasco and Stelco

- o The combined sales of the Big Three in 1980 was \$4.9 billion, with net earnings of \$363.7 million for a combined return of 7.4 percent on sales, down from 8.8 percent in 1979. However, the return on sales for the first six months of 1981 improved to 9.4 percent.

- o Return on capital employment in the iron and steel mills was 7.3 percent in 1980. It ranged in the past six years from a high of 9.3 percent in 1979 to a low of 5.4 percent in 1977.
- o The Canadian iron and steel industry is the 9th largest in the world, in terms of production. However, in terms of net income as a percent of sales or stockholders equity, the Big Three are among the top six companies in the world.
- o In spite of their high rankings among world steel producers, there are many weak spots among the Big Three. Some portions of the Algoma rail mill are 80 years old. Dofasco does not have any continuous casting facilities which improve efficiency by 10-15 percent. Stelco still produces over 50 percent of its steel in open hearth furnaces at its Hilton works in Hamilton - considered inefficient compared with basic oxygen furnaces used by most of the world's most competitive steel producers.
- o Capital expenditures by the Big Three were \$2.69 billion between 1975 and 1980, but the combined net income for the same period was only \$1.91 billion. Total internally generated funds net of depreciation by the Big Three during the period were only \$278 million, about 10 percent of total capital expenditures.
- o The steel industry's reliance on external sources for funds is on the increase. It may face difficulties in obtaining funds for proposed capital projects if the rate of return in the industry does not improve significantly.

Raw Materials

- o All four iron ore mines in Ontario are captive mines of the Big Three steel makers. These mines employ nearly 2,200 full time employees, and serve about 37 percent of the iron ore needs of the steel industry. The remaining iron ore requirements are sourced from either the Labrador area or the United States.

- o Ontario has vast iron ore resources, mostly in northwestern Ontario. However, none are likely to be developed in this decade.
- o Coal accounts for 70 percent of the total energy cost in steel production. Overall energy cost in the industry accounts for about 22 percent of manufacturing cost. At present almost all of the coal requirements for the steel industry are imported from the United States. The potential for energy savings in the steel industry is immense. The province of Ontario could initiate an evaluation program of efficiency in energy consumption by the steel industry and promote conservation. This would not only reduce our reliance on imported coal but in the process, our steel mills may develop some energy saving technology which can be marketed abroad. Provincial involvement in this area would be consistent with the overall commitment towards energy conservation.
- o Many other raw materials used in the steel industry are imported from Russia and many politically not so stable countries. Therefore it is recommended that a study be undertaken to determine the vulnerability of the Ontario manufacturing sector to interruptions in the supply of imported materials of strategic importance, to determine and how best to protect against such events.

Productivity

- o The gain in labour productivity in the steel industry has been minimal. Productivity is related to worker attitude and capital employed in the industry. Inspite of massive investments, labor productivity has remained almost unchanged. It may be an interesting and worthwhile study for future to evaluate the relationship between worker attitude and productivity.



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- o Dofasco is adding a \$450 million hot strip rolling mill scheduled to start production in mid-1983. Additional major programs include \$90 million for a pickle line (acid baths to clean steel).
-
- o Stelco's Lake Erie works, costing nearly one billion dollars, started production in June 1980, while a hot strip mill is planned for 1983. However, strikes at Stelco's main works in Hamilton and some finishing plants by Local 1005 of the United Steel Workers of America, since August 1, 1981, are a continuing cause of concern.
- o Algoma is adding a new seamless tube plant valued at \$500 million, in Sault Ste. Marie. It will create 500 full time jobs by 1984.
- o The Canadian steel industry's commitment for R&D has been very low. The industry often utilizes technology developed by others, for which it pays royalty. It is suggested that active government support of R & D specifically tailored for the steel industry will be quite beneficial to the long term well being of our economy. This research could be along the same lines as the geophysical research related grants provided by the Ministry of Natural Resources.

Steel Demand

- o Major users of steel include steel service centres (steel warehouses), the construction industry, pipe and tube manufacturers, and automotive and appliance manufacturers.
- o Steel Service Centres bought nearly 19 percent of total domestic steel shipments in 1980, followed by pipe and tube mills at 17.3 percent. Auto and auto parts producers received only 12 percent of total domestic steel shipments, compared to 18 percent in 1978. Steel fabricators, a component of construction activity received 10.8 percent of steel.
- o Demand from the auto and construction sectors is expected to remain relatively weak, while that from steel service centres is expected to be

strong. The energy sector will show the greatest growth rate now that the federal/Alberta pact has been signed. It may even become the largest single user of steel, largely in the form of oil country pipe and tubes.

- o Many large firms in the United States are planning major capital expenditures in pipe and tube manufacturing, making possible a future glut in this market.

International Trade

- o In 1980, exports accounted for 22.3 percent of total steel shipments, thus making exports the most important market for domestic steel producers. Most of these exports were to the mid-west United States, and to Central America and the Caribbean. This allowed the steel industry to operate at high capacity utilization rates. Without such exports the industry would have operated at below break even range.
- o Steel exports were valued at \$1.6 billion in 1980, while steel imports totalled \$940 million for a net trade surplus of \$660 million. In terms of tonnage, slightly more than 3 million tonnes of steel were exported and nearly 1.1 million tonnes were imported. The average value per tonne of steel exported in 1980 was \$429.12, while the average value of each tonne imported was \$655.05.
- o Recently the value of the Canadian dollar has appreciated considerably against the major steel producing countries of Europe. As a result, steel exports from Ontario will face stiff competition.
- o The Canadian steel industry is still protected by tariffs in spite of its stature worldwide. It is recommended that the issue of tariff protection to the steel industry be examined in depth with emphasis on its potential impact on the manufacturing sector in Ontario.
- o The steel industry in the third world is growing at extremely rapid rates with the most efficient technology. This will enable third world countries

to not only reduce imports but also to become exporters. Thus the established steel industry in developed nations will be under siege. It may be a useful exercise to examine the potential threat to Ontario's manufacturing sector posed by rapid growth in the third world over the next few years, and the steps that may be needed to circumvent it.

- o The steel industry in Japan credits its good working relation with the government for its success. All of the Canadian steel companies have expressed desire to improve communications and co-operation with all levels of government. Action in this area is urgently needed.
- o The Japanese steel industry improved its productivity by use of Industrial Productivity Improvement Centres. The Canadian steel industry could benefit from Japanese experience. Moreover, the Japanese reduced their energy usage by 12 percent between 1973 and 1980. Steel mills in Ontario could be encouraged to learn Japanese methods of energy conservation.

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I INTRODUCTION

This study of Ontario's steel industry has been prepared by the Economic Development Branch in line with its responsibility for the monitoring and analysis of regional economies and industries in Ontario. The steel industry is a major employer in Ontario, particularly in the Sault Ste. Marie and Hamilton areas, providing employment for approximately 44,000 people.

Steel shipments in the second quarter of 1980 dropped substantially, declining by 26 percent over the three month period. These reductions raised the question of whether Ontario's steel industry was faced with long term structural weaknesses which would see permanent reductions in employment within this sector. In line with the Province's regional employment objectives, permanent reductions of such magnitude could require the provincial government to make difficult policy choices regarding appropriate programs of adjustment assistance and/or support for the industry. In the United States, the industry and the federal government have already begun to face such choices following job losses in the steel sector of approximately 54,000 in 1980. In the EEC, where steel industry employment has fallen by over 100,000 jobs since 1975, governments have been forced to develop a number of major assistance programs.

Correspondingly, this in-depth study is intended to achieve an appreciation of Ontario's steel industry and the factors affecting the industry's vulnerability to competitive market changes, and to identify areas where a new Ontario Government policy stance towards the steel sector might be needed.

The report is organized in six chapters, commencing in Chapter Two with an examination of the importance of the steel industry to the economy of Ontario. In this discussion, principal statistics on employment, wages and salaries paid, value of shipments, value added and so on, are examined for iron and steel mills, pipe and tube mills and iron foundries. Based on the information reported, special emphasis is placed upon iron and steel mills by region.

The third chapter is a comprehensive discussion of Ontario's three largest steel-makers: Algoma, Dofasco and Stelco. These three companies account for about 90 percent of Ontario's steel production, and over 70 percent of the Canadian total. The analysis in this chapter covers topics ranging from raw material sourcing to production plants, type of products by company, and financial and operating performance. Moreover the strengths and weaknesses of individual companies are highlighted under varying markets for specific steel products. Efforts have been made to include the most updated information available.

Chapter Four identifies those industry groups which comprise the major source of demand for steel in Canada. Each sector is discussed individually in an effort to reveal the various factors which influence the domestic and foreign demand for steel. This leads into an analysis of the export market for Canadian steel products in Chapter Five. Emphasis is placed on the importance of the United States market and factors which influence the competitive position of the Canadian industry in export markets.

Chapter Six looks at the steel industries of those nations which represent the most important competition in Canadian domestic and export markets: various third world countries, Japan, and the European Economic Community. The discussion covers their steel-making capacity, production rates, national policies and their implications on Canadian steel mill products. Conclusions regarding the overall competitive position of the Ontario steel industry in domestic and export markets, and the need for further government measures are found in Chapter Seven. Recommendations for follow-up work are made throughout the report, and are listed in the executive summary. The appendices include a glossary of steel-related terms, and other details directly related to the study.

II. THE ONTARIO STEEL INDUSTRY

A. Definition of the Industry

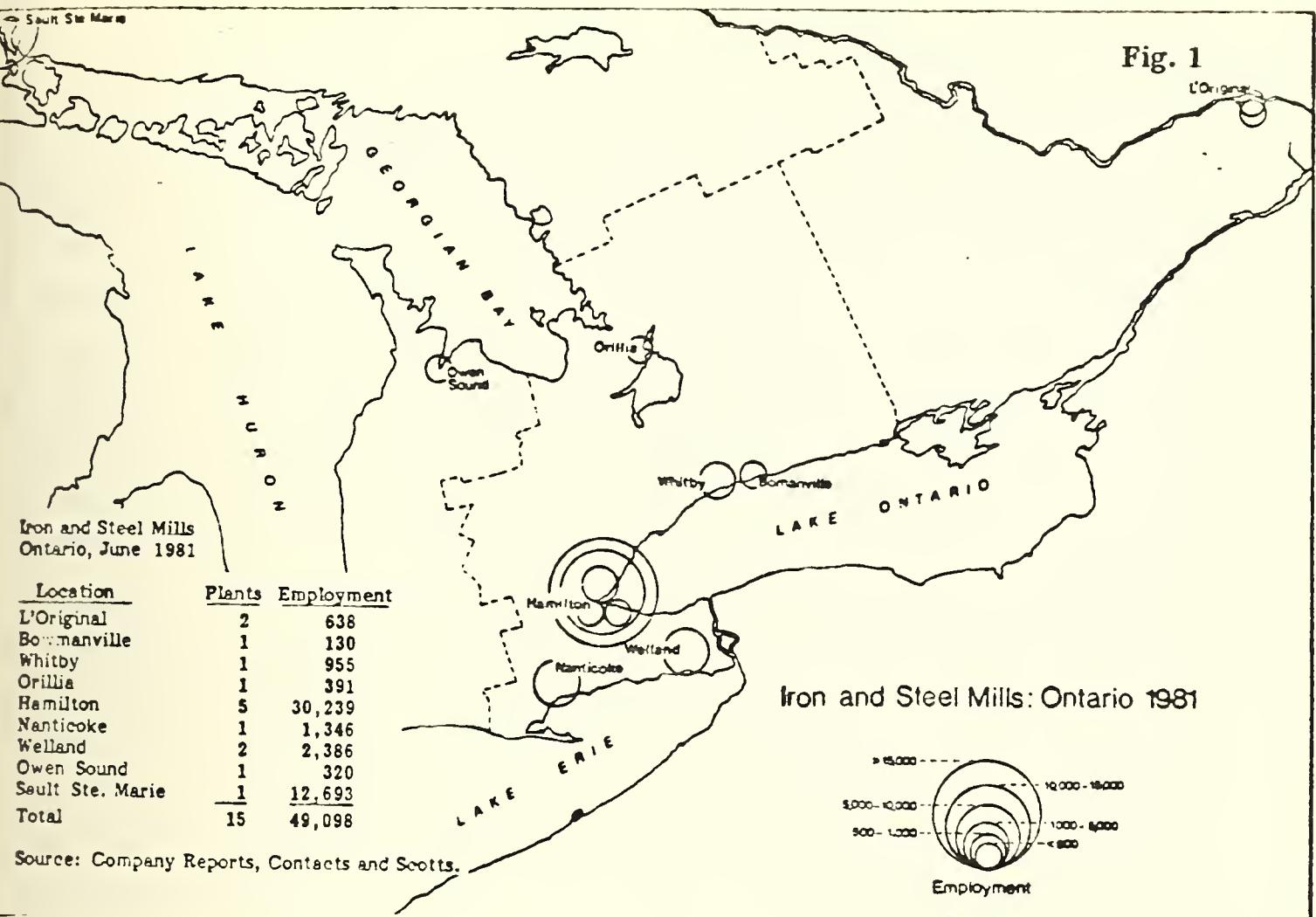
The Ontario 'steel industry' may be defined in a number of ways. The most common definition of the industry includes those companies classified by Statistics Canada as "Iron and Steel Mills" (S.I.C. 291). The broadest definition includes "Iron and Steel Mills" (S.I.C. 291), "Iron Foundries" (S.I.C. 294), and "Steel Pipe and Tube Mills" (S.I.C. 292).

The federal Department of Industry, Trade and Commerce defines the industry as those firms which produce steel and roll it into primary mill shapes. Using this definition, the Ontario steel industry is comprised of seven companies which fall into two main groups -the major integrated iron and steel producers (Algoma, Dofasco, and Stelco, usually referred to as the big three) and producers which operate electric furnaces and use ferrous scrap as raw material for steel-making (Atlas, Burlington, Ivaco, Lasco). This study assume that these seven firms define the Ontario steel industry, unless specifically stated otherwise.

B. Iron and Steel Mill Locations and Employment

(The locations and related employment of iron and steel mills in Ontario are shown in Figure 1. (The locations of major iron and steel mills in Canada are shown in Appendix 2.)

Ontario steel production capacity is concentrated largely around Hamilton and Sault Ste. Marie. This locational distribution reflects the domination of the industry by three major steel producers - Stelco, Dofasco and Algoma. These producers maintain integrated steel facilities which convert iron ore and coal into semi-finished or finished steel products. The major facilities of both Stelco and Dofasco are located in Hamilton. Algoma's works are centred in Sault Ste. Marie. A major addition to steel-making capacity was made in 1980 with the start up of Stelco's new steel plant near Nanticoke. In addition, Stelco has finishing plants scattered across Ontario, as identified in Table 3. Together, the mills of the three largest producers account for a production capacity of 14.6 million tonnes per annum, representing approximately 92 percent of Ontario's total steel-making capacity (See Table 1).



DISTRIBUTION OF STEEL MAKING CAPACITY IN ONTARIO BY COMPANY WITH LOCATIONS OF PLANTS.

Table 1

Company	Plant Locations	Annual Capacity (Million Tonnes)	As % of Ontario
1. Stelco	Hamilton, Lake Erie,	6.43	40.3
2. Dofasco	Hamilton	4.12	25.8
3. Algoma	Sault Ste. Marie	4.08	25.6
Total Integrated Producers		14.63	91.7
1. Atlas Steels	Welland	0.30	1.9
2. Burlington Steel	Hamilton	0.27	1.7
3. Lasco	Whitby	0.46	2.9
4. Ivaco	L'Original	0.30	1.9
Total Mini-Mills Producers		1.33	8.4
Total - Ontario Steel Industry		15.96	100.0

Note: Totals may not add due to rounding.

Source: Statistics Canada, Primary Iron and Steel Mills, Cat. No. 41-001, Feb. 1981.

The remainder of Ontario's steel-making capacity is provided by four non-integrated producers - Atlas Steels, Burlington Steel, Lasco and Ivaco -which depend on electric furnace or 'mini-mill' plants. Atlas Steels (a division of Rio Algoma Mines Limited) manufactures a wide range of speciality steels at a mini-mill in Welland. It might be called an integrated operation in that it starts with raw materials and ends up with finished products. The mill has an annual capacity of 0.30 million tonnes per annum. Burlington Steel (a division of Slater Steel Industries Limited) manufactures crude steel and rolled steel (specialty bars) of a mini-mill in Hamilton, having an annual capacity of some 0.27 million tonnes per annum. Lake Ontario Steel Company Limited (LASCO), is a private company manufacturing crude steel and rolled steel (bars and profiles) at a mini-mill in Whitby with an annual capacity of 0.46 million tonnes per annum. IVACO Industries Limited, (a Montreal-based company) manufactures bars and wire rod at a mini-mill in L'Original with an annual capacity of 0.46 million tonnes per annum. Together Ontario's mini-mills account for 1.5 million tonnes per annum, representing approximately 8 per cent of Ontario's total steel-making capacity.

It is useful to note that the Ontario steel industry, as represented by the seven companies noted above, accounts for approximately 94 per cent of Ontario's employment in SIC 291. The difference is due to the exclusion of steel foundries, ferroalloy plants and re-rollers of steel in the definition of the steel industry assumed in this study.

The Ontario steel industry represents nearly 80 percent of Canadian steel-making capacity and capability, as seen in Table 2. Algoma, Dofasco and Stelco combined account for about 73 per cent of Canadian capacity, illustrating their domination of the Canadian steel industry.

**STEEL MAKING CAPACITY AND CAPABILITY
CANADA AND ONTARIO.
January 1, 1981, (000 Tonnes)**

Table 2

	Capacity			Capability	
	Ingots	OH ²	Elet ³	Total	Total
BO ¹	OH ²	Elet ³			
Ontario	11,746	2,812	1,388	15,946	13,385
Canada	11,746	3,742	4,526	20,014	17,299
Ont. as a % of Canada	100	75.1	30.7	79.7	79.2
ADS as a % of Ontario	100	75.1	5.1	91.7	90.4
ADS as a % of Canada	100	75.1	1.5	73.1	70.0

1 Basic Oxygen Furnace

2 Open Hearth Furnace

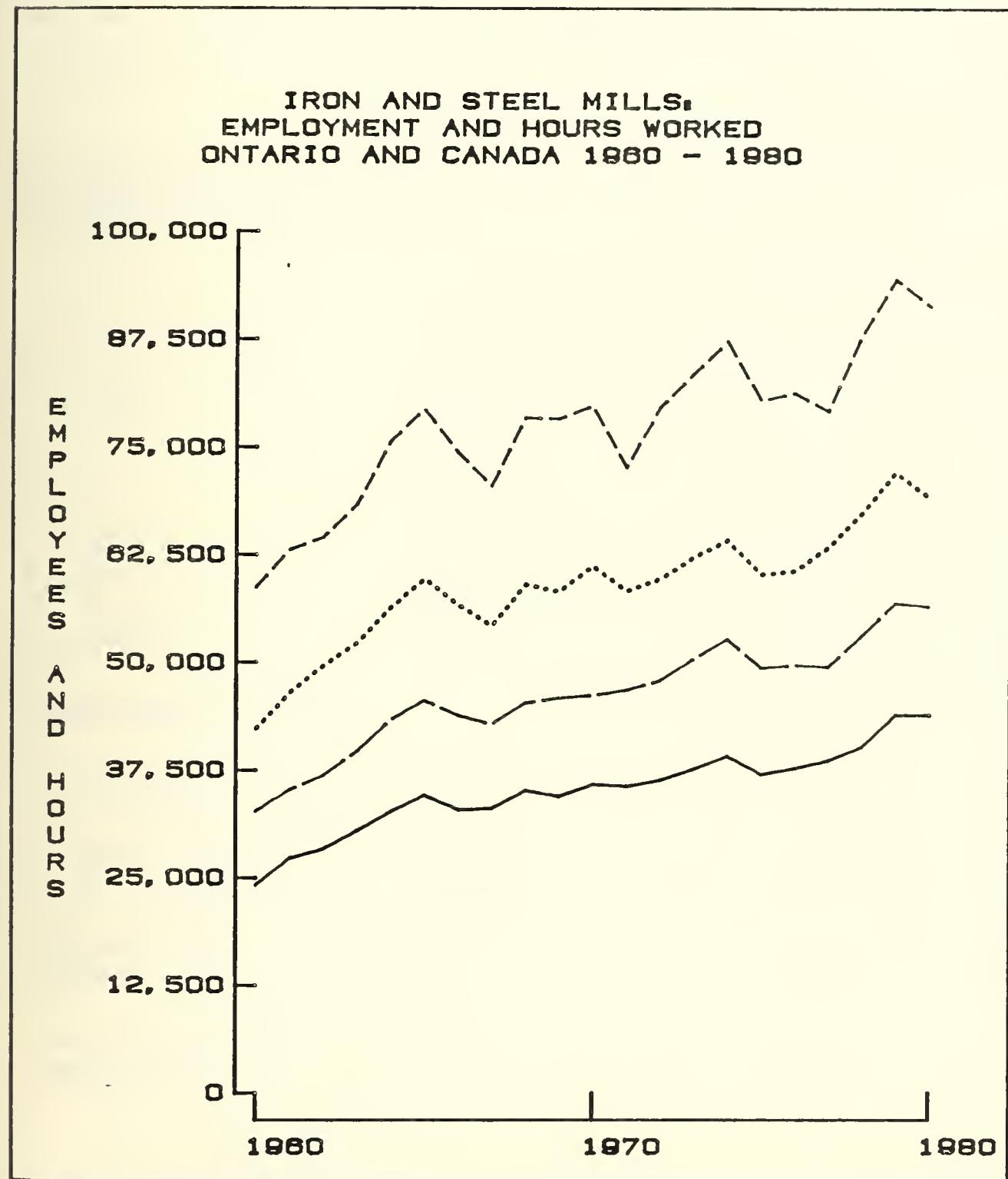
3 Electric

4 ADS - Algoma, Dofasco and Stelco combined.

Source: Statistics Canada, Cat. 41-001, Feb., 1981.

Similarly, Figure 2 demonstrates that Ontario steel mills account for a large but slightly declining share of total employment in the Canadian steel industry.

Fig. 2



SOURCE: STATISTICS CANADA

— CANADA-TOTAL EMPLOYEES
— ONTARIO-TOTAL EMPLOYEES
--- CANADA-HOURS WORKED (IN THOUSANDS)
..... ONTARIO-HOURS WORKED (IN THOUSANDS)

The distribution of steel industry employment is almost identical to that of steel-making capacity as shown in Table 3. Steel industry employment in Ontario is concentrated in the central and northern regions of the Province with Hamilton (59 percent) and Sault Ste. Marie (24 percent) accounting for 83 percent of the total. Together, the three large integrated producers account for 91 percent of total Ontario steel industry employment. Stelco, alone, accounts for over 40 percent of that employment with Algoma and Dofasco contributing shares of approximately 25 percent each. Ontario's mini-mills combined contribute approximately 9 percent of total industry employment.

DISTRIBUTION OF EMPLOYMENT IN THE
ONTARIO STEEL INDUSTRY: 1980

Table 3

<u>Company</u>	<u>Plant Location</u>	<u>Employment</u>	<u>As % of Ontario</u>
1. Stelco	Hamilton	16,331	32.6
	Welland	1,625	3.2
	Nanticoke	1,381	2.8
	Swansee	401	0.8
	Gananoque	241	0.5
	Brantford	168	0.3
2. Algoma	Sault Ste. Marie	11,921	23.8
	Wawa	772	1.5
3. Dofasco	Hamilton	12,688	25.3
Total-Integrated Producers		45,528	90.8
4. Atlas Steels	Welland	2,186	4.4
5. Lake Ontario Steel Co.	Whitby	955	1.9
6. Ivaco Limited	L'Original	638	1.3
7. Burlington Steel	Hamilton	825	1.6
Total-Mini-Mills Producers		4,604	9.2
Total-Ontario Steel Industry		50,132	100.0

Source: Scott's Industrial Directory 13th Edition, May 1981, and direct contact with companies.

Even if Ontario's steel industry is defined to include primary iron and steel mills (SIC 291), iron foundries (SIC 294), and steel pipe and tube mills (SIC 292), employment remains concentrated in Hamilton and Sault Ste. Marie (see Table 4). Employment in iron and steel mills alone (SIC 291) is 50,132, representing 81.6 percent of total employment in the industry as defined above.

DISTRIBUTION OF EMPLOYMENT IN
ONTARIO'S STEEL INDUSTRY (S.I.C. 291, 292, and 294)
BY REGIONS, 1980

Table 4

Region	Employment	As % of Ontario
Eastern Ontario	1,065	1.7
Central Ontario ¹	45,495	74.1
South Western Ontario	1,991	3.2
Northern Ontario ²	12,884	21.0
Total Ontario	61,435	100.0

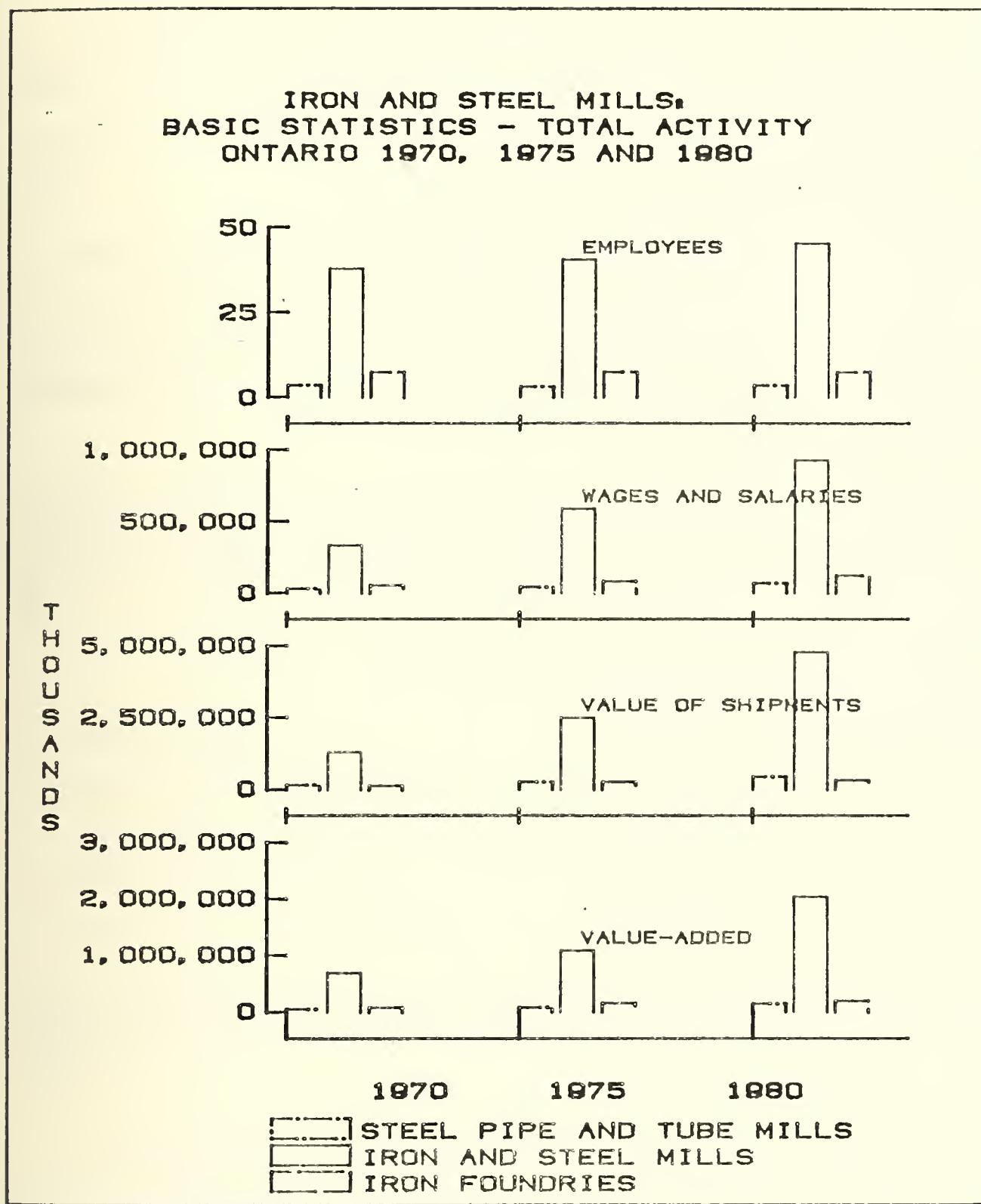
1. Includes Hamilton

2. Includes Sault Ste. Marie.

Sources: Company Reports and Scotts Industrial Directory, May 1981.

The relative importance of the three segments (SIC 291, 292, 294) of the industry is shown in Figure 3 by employment, wages and salaries paid, value of shipments and value-added. All of these measures demonstrate the large size of the iron and steel mills segment (SIC 291) relative to the others. In general, it can be said that iron and steel mills effectively dominate the steel industry.

Fig. 3



SOURCE: STATISTICS CANADA

C. Importance to Ontario's Economy

Ontario's steel industry provides employment for over 45,000 production employees, accounting for 5 percent of Ontario's total manufacturing employment. (See Table 5) However, the high capital intensity of steel production gives the steel industry a greater share of the total value-added

and value of shipments in Ontario's manufacturing sector. The steel industry's 6 per cent share of total wages and salaries in Ontario's manufacturing sector (relative to a 5 percent share of employment) is explained by a relatively higher labour productivity that results from high capital/labour ratios in the steel sector.

Steel production is highly energy-intensive. The industry accounts for 13.5 percent of energy consumption by Ontario's manufacturing sector. This does not include the cost of coal because Statistics Canada treats it as a raw material rather than a fuel. (See Table 5)

**ONTARIO'S IRON AND STEEL MILLS (SIC 291):
PRINCIPAL STATISTICS AND COMPARISONS
WITH ONTARIO'S MANUFACTURING SECTOR,
1979.**

Table 5

Indicator	Ontario SIC 291	As % of Ontario Manufacturing
1. Total Employees	45,419	5.0
2. Total Wages and Salaries (\$000)	927,649	6.1
3. Value of Shipments (\$000)	4,788,447	6.3
4. Total Value - Added (\$000)	2,039,145	6.2
5. Consumption of Energy (\$000)	234,336	13.5

Source: Statistics Canada Primary Iron and Steel Mills, Cat. No. 41-001, and Manufacturing Industries of Canada; National and Provincial Areas, Cat. No. 31-203.

The importance of the steel industry to the Ontario economy should also be considered in relation to the users of steel output. The steel industry is an important capital goods industry, the health of which will influence investment activity (ie. construction, steel fabrication, pipes and tubes) and durable consumer goods industries (ie. motor vehicles and parts, containers and appliances) in Ontario. In fact, the relationship between the steel industry and these user industries is one of mutual interdependence. However, steel industry output does not follow closely the fortunes of any one particular sector (eg. motor vehicles, construction). Because steel industry output is utilized by

a number of sectors, including exports, it is difficult to trace fluctuations in steel industry demand to any particular manufacturing industry. Consequently, cycles in steel industry output correlate more strongly with general economic conditions as demonstrated by the index for manufacturing output or for domestic product. It is apparent that steel industry output is subject to relatively wider fluctuations than is the total output of all Canadian manufacturing industries or Canadian real domestic product. (See Table 6)

**ANNUAL GROWTH RATES OF REAL OUTPUT:
SELECTED INDUSTRIES AND
THE CANADIAN ECONOMY, 1977-1980
(percent)**

Table 6

	<u>Iron and Steel Mills</u>	<u>Motor Vehicles</u>	<u>Construction</u>	<u>Manufacturing</u>	<u>Real Domestic Product</u>
1977	3.3	9.0	-0.8	1.3	2.8
1978	12.8	0.6	-0.8	5.7	3.5
1979	6.6	-7.5	1.2	3.9	3.1
1980	1.2	-22.8	1.3	2.8	0.2

Source: Statistics Canada Index of Real Domestic Product, Cat. No. 61-005

The level of steel output tends to follow cyclical fluctuations in real national product and in manufacturing generally, while annual percentage changes in steel output tend to be larger. These results follow from the fact that the demand for steel comes from a number of industries, the majority of which are subject to relatively wide fluctuations in the demand for their own products.

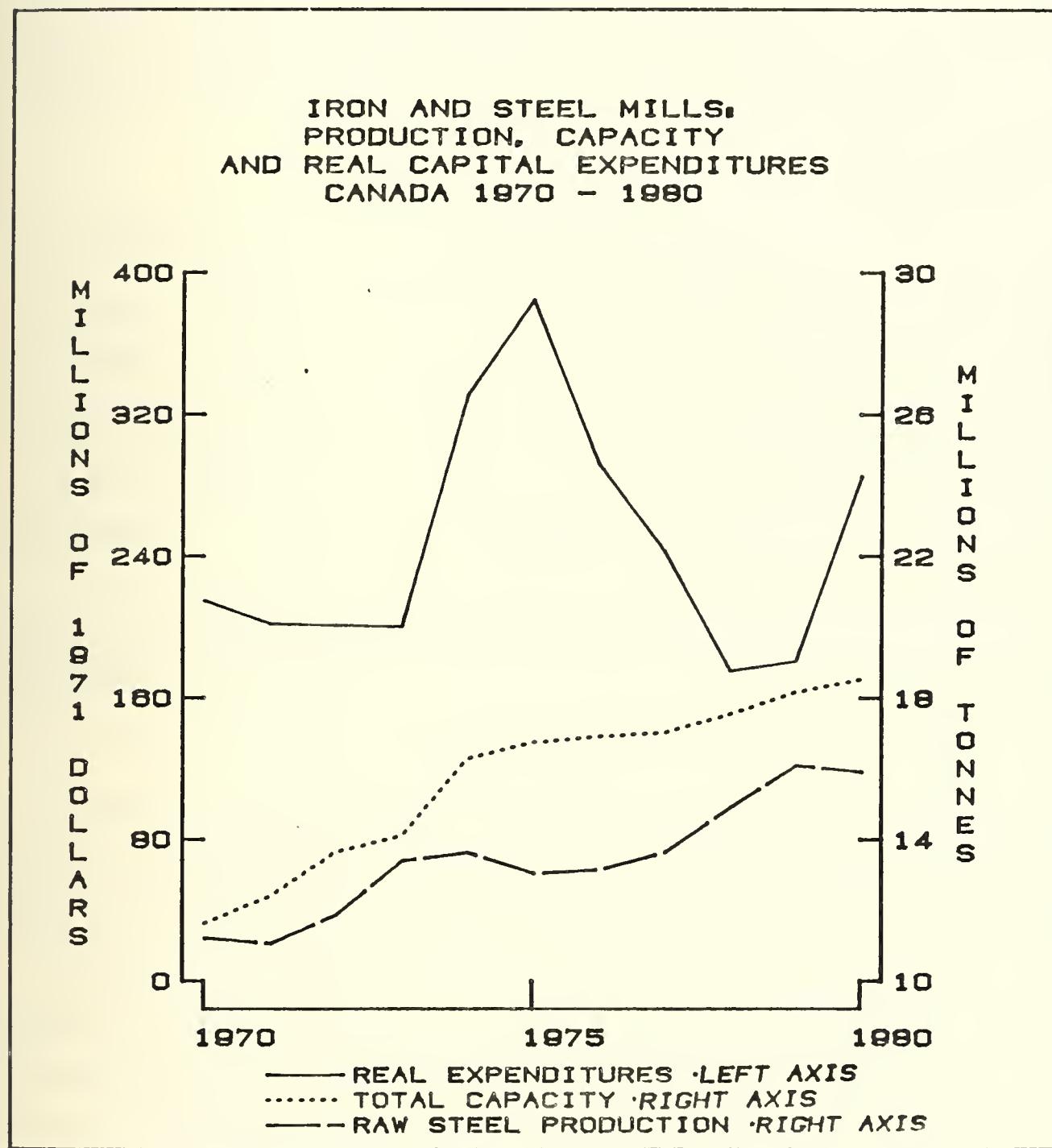
The steel industry in Ontario has continued to increase its capacity and remains an important source of investment expenditure in the Province. Real capital expenditures from 1970 to 1980 are shown in Figure 4. Most notable of these expenditures are:

- o Stelco's investment of nearly \$1 billion at Nanticoke which increased Ontario's raw steel-making capacity by 1.2 million tonnes per annum, or 7.5 percent of total capacity as of Jan. 1, 1981. This capacity can be increased as required at marginal cost.
- o Dofasco's approval for construction of a second hot-strip mill at a cost of \$450 million. The mill is scheduled to be completed in 1983, with an initial steel-rolling capacity of nearly 1.1 million tonnes per annum.
- o Algoma's recent capital expansion projects (seamless tube mill, coke oven battery and heat-treated plate line) to be completed by 1984 at a cost of \$445 million.

The Ontario steel industry, as a general policy, has attempted to develop capacity in line with long-term trends in the growth of Canada's domestic demand for steel rather than short-term cyclical peaks in demand. As shown in Figure 4, growth of total capacity has slowed recently, reflecting expectations for lower long-term growth of Canadian steel demand.

Real capital expenditures in the steel industry are very volatile because of the cyclical nature of activity. However, they have contributed to a continued increase in steel-making capacity as shown in Figure 4.

Fig. 4



SOURCE: STATISTICS CANADA

Ontario's steel industry will continue to be an important source of investment expenditure, particularly in the Central and North Eastern regions of the province. Close to \$564 million is expected to be invested in 1981 by the steel mills in Ontario to improve production capacity. (See Table 7)

ONTARIO'S STEEL INDUSTRY (SIC 291):
CAPITAL EXPENDITURES BY REGION,
FORECAST FOR 1981 (\$ 000)

Table 7

Region	Capital Expenditures		
	Construction	Machinery and Equipment	Total
1. Eastern	10	91	101
2. Central	91,343	322,628	413,971
3. South Western	-	-	-
4. North Eastern	3,700	146,000	149,700
5. North Western	-	30	30
Total Ontario	95,053	468,749	563,802

Source: Statistics Canada Capital and Repair Expenditures, Manufacturing Sub-Industries, Cat. No. 61-214.

Moreover, when this figure is combined with the repair expenditures expected by the industry in 1981, total capital and repair expenditures totalling over \$1.5 billion are forecast for 1981. These investment expenditures, in 1981 and onwards, will create additional employment opportunities in Ontario.

Ontario's steel industry is also important to the Ontario economy as a generator of tax revenues for the provincial and federal governments. It is estimated that, in 1980, Ontario's steel industry generated approximately \$54 million in personal income tax (PIT) revenues and \$11 million in corporation income tax (CIT) revenues - a total of \$65 million to the Government of Ontario.¹

¹Statistics Canada, Primary Iron and Steel Mills, Cat. No. 41-001, Corporation Taxation Statistics, Cat. No. 61-208 and consultations with the Tax and Fiscal Policy Division, Ministry of Treasury & Economics.

The material demands of the steel industry stimulate further activity in various sectors of the provincial economy. Such direct and indirect impacts are felt especially in the Hamilton area. For example, the strike of Stelco's hourly employees has resulted in a direct reduction of some \$6 million per week in gross earnings. In addition, the steel industry supports four iron ore mines in Ontario, employing 2,200 persons in January 1981, and a number of limestone quarries. Steel manufacturing and mining activities create further demand for parts, supplies and services.

Ontario's manufacturing base derives a further benefit from prices that are low relative to imported steel prices. The cost advantage can be passed on to domestic consumers of steel, providing a competitive edge for their goods in international trade.

III. THE BIG THREE STEEL COMPANIES

A. General

Algoma of Sault Ste. Marie and Dofasco and Stelco of Hamilton are the three largest steel producers in Canada and are referred to as "the big three". With combined sales exceeding \$4.9 billion in 1980, the net earnings of the big three were \$363.7 million, a combined return of 7.4 percent on sales. This rate dropped from 8.8 percent in 1979 because net earnings of the big three declined by \$42 million from 1979 levels even though sales increased by over \$312 million in this period. (See Table 8). Sales by the big three for the first six months of 1981 were \$3,040 million, with combined net earnings during this period of \$287 million. This is quite an improvement over 1980 levels for the comparable period. In the first six months of 1980, sales for the big three were only \$2,474 million while earnings were only \$199 million. Thus, return on sales has increased from 8.0 percent to more than 9.4 percent.

AGGREGATE FINANCIAL DATA:
ALGOMA, DOFASCO AND STELCO, 1976-1981 Q2
(millions of dollars)¹

Table 8

	1975	1976	1977	1978	1979	1980	Six Months Ended June 30, 1981
Sales	2,481.3	2,849.6	3,050.8	3,760.3	4,607.5	4,919.6	3,039.6
Net Earnings	187.8	181.4	196.2	292.3	405.7	363.7	286.8
Dividends							
Common	81.0	78.0	68.7	69.3	91.0	98.3	98.5
Preferred	0.9	4.4	20.4	30.4	37.8	60.6	98.5
Wages & Salaries Paid	630.3	705.5	769.8	889.3	1,009.0	n/a	n/a
Capital Expenditures	482.6	336.9	334.3	318.6	446.3	485.4	284.2
Long Term Debt	865.3	1,062.3	1,130.2	1,094.7	1,106.0	1,243.9	1,222.7
Interest on Long Term Debt	59.1	93.6	108.3	112.5	100.6	115.2	64.9
Return on Average Capital Employed in Percent	7.0	5.8	5.4	7.3	9.3	7.3	n/a

¹Unless otherwise stated

Sources: Algoma, Dofasco and Stelco, Annual Reports and presentation to Federal Cabinet, July 7, 1981

Return on in 1980 sales aggregated for the big three was 7.8 percent. These results may not appear impressive, but in 1979 the big three ranked first, second and third in this regard among the major steel producers of the world. (See Tables 9 & 10) Similarly, in terms of returns on average capital employed Canadian steel mills rank very high. These results are borne out in a recent study by the Office of Technology Assessment of the U.S. Congress. The study concluded that U.S. steel mills show the highest rates of return except for Canadian mills which have been consistently ahead.

**STEEL-MAKERS OF SELECTED COUNTRIES:
FINANCIAL PERFORMANCE, 1978**

Table 9

	<u>Canada</u>	<u>U.S.A.</u>	<u>Japan</u>	<u>German</u>	<u>U.K.</u>
Net Income as % of Sales	7.8	2.9	0.6	0.1	Loss
Net Income as % of Stock Holder's Equity	11.6	7.7	3.4	0.6	Loss
Equity as a % of Debt	61.1	45.0	9.6	20.4	31.8

Source: Dofasco, 1981.

Canada ranks as the 9th largest steel-making country in the world in terms of steel production. Canadian steel mills ranked 22nd (Stelco), 32nd (Dofasco) and 35th (Algoma) among the world's major steel mills in 1979. As seen in Table 10, rankings for net income as a percent of stockholders equity, and for output per employee were also relatively high. Lower rankings were achieved for sales, assets per employee and sales per employee.

**WORLD RANKINGS OF THE BIG THREE:
SELECTED MEASURES, 1979.**

Table 10

	<u>Algoma</u>	<u>Dofasco</u>	<u>Stelco</u>
Steel Production	35	32	22
Sales	39	35	27
Net Income (N.I.)	11	10	6
N.I. as % of Sales	1	2	3
N.I. as % of Stockholders Equity	3	2	6
Assets per Employee	30	19	24
Sales per Employee	30	18	32
Output per Employee	15	7	17

Source: Dofasco, 1981.

B. Steel Production Process, Similarities and Differences

The big three steel mills all are integrated producers, and on the surface their operations appear similar. However, it is important to understand the differences:

- o Algoma produces steel by basic oxygen furnaces. It had a capacity of 4,082,000 tonnes of ingots, representing almost 35 percent of Ontario's ingot-making capacity. But the steel-making capability (ie. effective available capacity) was only 2,901,000 tonnes, representing 22 percent of the Ontario capability. In 1980, Algoma produced 3.2 million tonnes (MMT) of raw steel. In 1981 a major blast furnace relining is planned for this year which reduces the capability for the year.
- o Dofasco has only slightly greater capacity than Algoma, but its capability on January 1, 1981, at 3.7 MMT or 27.6 percent of Ontario's total, was almost 6 percentage points greater than that of Algoma. Over 98 percent of Dofasco's steel is produced in Ontario by its basic oxygen furnaces, the remaining 2 percent being produced by electric furnace in Calgary.

- o Stelco is the only steel producer in Canada which produces steel by the open hearth furnace. At its Hilton Works in Hamilton over 50 percent of steel capacity is in open hearth furnaces, which require about 18 percent more man hours for each ton of steel than do the basic oxygen furnaces. the BOF. Stelco is also the only major steel-maker currently producing steel by basic oxygen furnaces at two locations (Hamilton and Lake Erie). Steel from the Lake Erie works near Nanticoke is trucked in slab forms to Hamilton for further processing. This higher cost arrangement is believed to be temporary and may end sometime in late 1983.

Other differences among the steel-makers pertain to steel casting:

- o Both Algoma and Stelco have continuous casting facilities where molton steel is poured in to draw a continuous thick slab of steel which is cut to desired lengths. (For details see Appendix 4) At Algoma, "approximately 30 percent of raw steel was continuously cast in 1980 with a favourable impact on yield, cost and product quality. This reflects a major increase over the 7% cast in 1976."¹ In the first quarter of 1981, 35 percent of Algoma steel production was continuously casted. A recent U.S. congress study shows that continuous casting is 10 - 15 percent more efficient than ingot production and rolling.
- o Dofasco is the only major company which does not have any continuous caster in place or planned. The cost advantage to Dofasco of installing a continuous caster may be towards the lower end of the 10-15 percent range mentioned above because (i) Dofasco transports ingots while they are still hot to the soaking pits, so that the heat loss is relatively low, and (ii) Dofasco rolls ingots directly into sheet.

These three major steel makers differ on product lines as well.

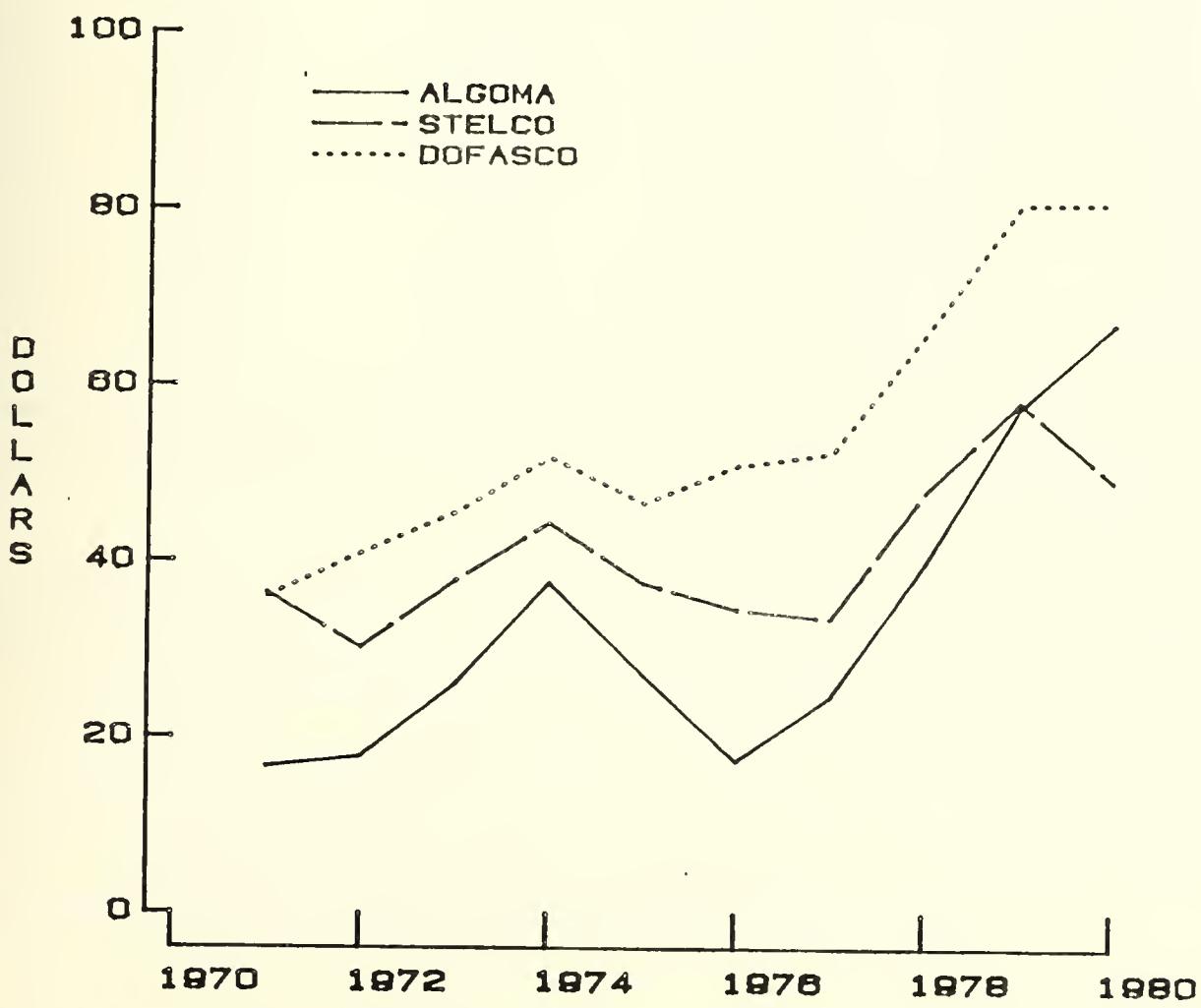
- o Algoma does not have a metal coating operation such as tin plate, galvanized steel or prepainted panels. Dofasco and Stelco enjoy almost total control of this market.

¹ Algoma Steel, Annual Meeting Technical Sessions, April 20, 1981, p.2.

- o Dofasco is the only major steel-maker which does not produce long products such as rails, etc., It concentrates only on flat rolled products such as sheets and plates. Dofasco is highly committed to finished sheet steel, and it has started converting one galvanizing line to a new coated product called galvalume.
- o Stelco is the most diversified of the big three, producing the most extensive range of steel products including fences, nuts and bolts, nails, pipes and tubes, sheets, strips and coated steels. In fact, Baycoat, which produces prepainted steel for products such as office furniture and appliances is jointly owned by Stelco and Dofasco.

Fig. 5

COMPARATIVE OPERATING INCOME PER TONNE
STELCO, DOFASCO, ALGOMA
1971 - 1980



SOURCE: STELCO DOFASCO ALGOMA ANNUAL REPORTS

C. Capital Operating Income and Rates of Return

Because of the differences outlined above, operating income per tonne of steel differs significantly from the combined average of \$62 for the big three. As illustrated in Figure 5, operating income per tonne of steel produced in 1980 was highest for Dofasco at \$81, followed by Algoma at \$67, and Stelco at \$49. Between 1971 and 1980, Dofasco's operating income per ton was the highest with the exception of 1971. Algoma's operating income has been the lowest with the exception of 1980. Table 11 shows the combined average per tonne operating income of the big three.

THE BIG THREE STEEL COMPANIES:
CONSOLIDATED PRODUCTION AND STEEL YIELD,
1971-1980

Table 11

Year	Raw Steel			Operating Income (\$000's)	Operating Income/Tonne
	Production (000's Tonnes)	Shipments (000's Tonnes)	Yield ¹		
1971	8,618	6,532	75.8	234,540	\$ 27.21
1972	9,281	7,008	75.5	279,526	\$ 30.12
1973	10,350	7,722	74.6	383,383	\$ 37.04
1974	10,311	7,758	75.2	460,698	\$ 44.68
1975	10,157	7,277	71.6	380,581	\$ 37.47
1976	10,839	7,907	72.9	378,972	\$ 34.96
1977	10,839	7,976	73.6	396,781	\$ 36.61
1978	11,284	8,787	77.9	576,387	\$ 51.08
1979	12,202	9,169	75.1	791,444	\$ 64.86
1980	11,918	8,923	74.9	744,560	\$ 62.47

¹Shipments as a percent of tonnes produced.

Source: Algoma Limited, Stelco Limited, and Dofasco Limited, Annual Reports.

Similar to operating income per tonne, Dofasco had the highest return on common equity for all the selected years (1970, 1978 to 1980) as shown in Table 12. In 1979, Dofasco's return on common equity (ROE) was 18.75 percent, its highest ever, but it subsequently dropped to 14.5 percent in 1980. Algoma ranked second with an ROE of 13.18 percent, and Stelco was third at 9.48 percent. These rankings may change when full production from the Lake Erie works starts, showing a positive impact on Stelco's balance sheet.

**THE BIG THREE STEEL COMPANIES:
PROFITABILITY RATIO ANALYSIS,
1970, 1978, 1979, 1980**

Table 12

	<u>1970</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>Return on Common Equity</u>				
Stelco	10.47	11.40	14.05	9.48
Dofasco	11.82	14.99	18.74	14.50
Algoma	9.64	12.23	17.48	13.18
<u>Net Profit Margins</u>				
Stelco	8.44	6.77	7.50	5.93
Dofasco	9.98	8.47	9.54	7.93
Algoma	9.16	8.05	10.35	9.51
<u>Return on Assets</u>				
Stelco	6.49	7.74	8.68	6.52
Dofasco	7.02	8.68	10.16	8.35
Algoma	6.62	9.16	11.45	9.71

Source: Company Records and Financial Post Data Base

In terms of returns on assets and net profit margins, Algoma and Dofasco show more or less comparable returns, with Stelco always placing third. As mentioned earlier, Ontario steel mills rank near the top in international comparison by such indicators, however, these rates of return are not attractive for new capital at high interest rates.

Capital expenditures for the big three totalled approximately \$2.69 billion between 1975 and 1980. Such magnitudes are needed to maintain their competitiveness in a highly capital intensive industry. This creates a problem, however, since combined earnings for the big three, during the same period, totalled only \$1.91 billion. Net internally generated funds by the big three during the period were only \$278 million. As a result, they have been forced to look outside their respective companies for the funds to finance their capital expenditures. (More detailed analysis is in Appendix E.)

The primary sources of funding for the three firms have been proceeds from the issue of long term debt, and common and preferred shares, as outlined below:

- o Dofasco received \$58.9 million by issue of preferred shares in 1980. An issue of sinking fund debentures provided a further \$50.6 million in 1980. During 1979 and 1980 approximately \$4.3 million was raised by the issue of common shares for cash. However, during these two years Dofasco retired \$30.3 million of their long term debt.
- o Algoma's proceeds from the issue of common shares in 1979 and 1980 amounted to over \$77 million. A further \$142 million was raised in the form of a long term debt. However, during these two years, Algoma retired \$97.2 million of long term debt.
- o Stelco's net proceeds from the issue of preferred shares in 1980 was a hefty \$267.6 million, and 2 year combined proceeds were \$300.5 million. Net proceeds from the issue of long term debt in 1980 were \$108 million, while in the same year \$19.4 million of long term debt was retired.

The debt to equity (DE) ratio shows the relationship between long term debt and total shareholders' equity. Interestingly, the DE ratio of the big three in 1978 was nearly double the 1970 ratio, but shareholders equity (mostly preferred shares) increased more than the debt to equity ratios declined. (See Table 13) Algoma managed to retire over \$97 million of long term debt, therefore its ratio improved the most.

**THE BIG THREE STEEL COMPANIES:
RISK RATIOS, 1970, 1978, 1979, 1980.**

Table 13

	<u>1970</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>Debt to Equity Ratio</u>				
Stelco	.206	.431	.395	.372
Dofasco	.254	.459	.379	.381
Algoma	.188	.396	.416	.335
<u>Preferred Dividend and Interest Coverage Ratio¹</u>				
Stelco	26.630	3.036	3.687	2.326
Dofasco	9.546	3.548	4.893	4.037
Algoma	5.313	2.836	4.141	3.966

1 For 1970, Financial Post Data Base reports only the interest coverage ratio, not the combined ratio reported for 1978-1980.

Source: Financial Post Data Base

The debt to equity ratio in 1980 was 0.335 for Algoma, 0.372 for Stelco, and 0.381 for Dofasco. By itself, a debt to equity ratio in this range is quite acceptable for any capital intensive industry. However, two notes of caution must be expressed. First, DE ratios are much higher now than in 1970, showing a greater reliance on debt instruments to finance capital projects, and at a current prime rate of almost 23 percent (Sept. 1, 1981), the return on assets will have to be much higher in order for the companies to obtain long term loans at reasonable rates. Second, Dofasco and Stelco both raised large amounts of funds in 1980 by the issue of preferred shares. The accounting practice usually includes the proceeds from the sale of such shares in equity. In economic terms this practice may be questioned since proceeds from the sale of preferred shares bring with them a fixed commitment for funds in terms of dividends. The dividend rate may be less than the going prime lending rate, but still it creates an additional commitment on funds. Thus, if preferred stock equity is added to the debt side of the equation, we would find that the DE ratio has in fact been climbing since 1978. These two facts could have serious consequences for the big three with respect to liquidity. If fixed annual charges were to increase faster than earnings, the big three could find themselves without sufficient cash reserves to meet expenses as they fall due.

The coverage ratio indicates the number of times that preferred dividend payments and interest charges are earned. As fixed commitments for interest charges and dividends for preferred shares increase, the coverage ratio declines as it has for all three firms since 1979. This indicates that the earnings have decreased, the use of debt instruments has grown, or a combination of the two. Of the big three, Stelco's interest coverage ratio at 2.3 is much below that for Dofasco and Algoma. It indicates that nearly half of the company's earnings have gone toward meeting fixed charges. If earnings should drop unexpectedly, Stelco may become illiquid.

The liquidity of a firm measured in terms of current ratio (current assets to current liabilities) for 1980 is comparable for the big three. Stelco's current ratio in 1980 at 3.60 is barely ahead of Algoma's at 3.58 and Dofasco's at 3.50. As can be seen from Table 14, this ratio has been climbing steadily over time, with a big increase for all three in 1980. In light of the fact that the coverage ratios of the big three declined over this same period, it may well be that this increase was planned by each firm to act as a buffer against untimely cash flow shortages.

THE BIG THREE STEEL COMPANIES:
LIQUIDITY RATIOS, 1970, 1978, 1979, 1980

Table 14

	<u>1970</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>Current Ratio</u>				
Stelco	2.68	2.98	2.94	3.60
Dofasco	2.11	3.02	2.96	3.50
Algoma	1.68	2.33	2.89	3.58
<u>Acid Test</u>				
Stelco	1.40	1.42	1.00	1.60
Dofasco	.89	1.41	1.36	1.72
Algoma	.68	.92	1.04	1.56

Source: Financial Post Data Base

The acid test or the quick ratio is an indicator of the short term liquidity of a firm. Dofasco in 1980 is ahead of the other two at 1.72, and Algoma is lowest at 1.56. This indicates that inventories contribute more to the current assets of Algoma than to those of Stelco, and the least to those of Dofasco. However, if we look at the inventory turnover ratios of the respective firms in Table 15, we see that Algoma's turnover ratio is the highest, closely followed by Dofasco, and more than 14% higher than Stelco's. This indicates that Algoma's stock of inventories is relatively more liquid than Stelco's, thereby putting Algoma in a better position of liquidity than Stelco. The highest turnover rate for the big three from, 1967 to 1980, was in 1974. The inventory turnover rates for all of the big three declined significantly from their peak levels of 1974.

THE BIG THREE STEEL COMPANIES:
INVENTORY TURNOVER RATIOS¹

Table 15

	<u>1970</u>	<u>1974</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
Stelco	4.18	4.48	3.78	3.40	3.17
Dofasco	4.14	5.01	3.42	3.38	3.62
Algoma	3.86	5.05	3.95	3.89	3.63

¹Based on Sales

Source: Financial Post Data Base

The U.S. Steel Corporation, the largest steel-maker in the U.S., in association with the Morgan Stanley brokerage firm devised a plan of financing which will not put any financial strain on the company in providing it with \$650 million for capital expansion in a 600,000 ton per year seamless pipe plant. Simply stated, the plan involves:

- o Securing ten year contracts from oil companies and oil field equipment suppliers for seamless pipe products;
- o Using these long term commitments to get equity participation by firms placing orders and others. The funds are used to build the pipe and tube plant;
- o Providing U.S. Steel with a 10 year lease at low cost with an option to buy. U.S. Steel will operate the plant.

The plan as described by Mr. Roderick, Chairman, U.S. Steel is:

"(U.S. Steel will get) . . . big equity investors to put up \$225 million in return for investment tax credits, depreciation, interest (charges) deductions and the mill's residual value; and for lenders to provide the rest through a 10 year loan to the equity holders at market rates. U.S. Steel will lease the plant for 10 years at a cost equivalent to 6% to 7% money (then for a subsequent 15 years at a pittance)."¹

In addition, U.S. Steel will get various additional benefits from this package, such as the bulk of the lease payment tax deduction after the company has written off its plant closings in 1979, and no rental payments for the first 10 years.

In the interim, U.S. Steel will buy 120,000 tons of foreign produced seamless tube over the next five years to supply to its customers. The new plants will be ready by then and will service the future need of its customers.

¹Forbes, March 25, 1981

In Canada, Merrill Lynch Royal Securities of Toronto devised a new form of preferred share commercial paper or short term preferred shares. Transalta Resources will be the first company to test this concept by offering 30 to 360 day maturity preferred shares. Each share is valued at \$1,000 with a minimum order of 250 shares. The after-tax cost of preferred shares is significantly lower than that of short term commercial paper. This instrument may be of particular interest to companies which pay little tax either because of losses or rapid expansions that increases depreciation write-offs.

D. Efficiency in Operation

The efficiency of a steel-making operation is determined by a large number of variables such as the size, type and age of the plant; operating rates; yield rates; material input costs; employee attitude and productivity. A few of the most important variables are analysed here so as to have a better understanding of the operations of individual steel companies.

i) Size and Type of New Plant

As mentioned earlier, Ontario's steel industry is composed of three large integrated steel producers and four mini steel mills. The average size of a Canadian steel plant in 1978 was 3.3 million tonnes of raw steel capacity compared with 6 million tonnes in Japan and 2.3 million in the United States. Most of the new steel plants being built in the world have flexible capacity which can be increased without high expansion costs. Stelco's Lake Erie works is designed in this manner. The main production facilities of Algoma, Dofasco and Stelco can also undergo expansions, but at very high costs.

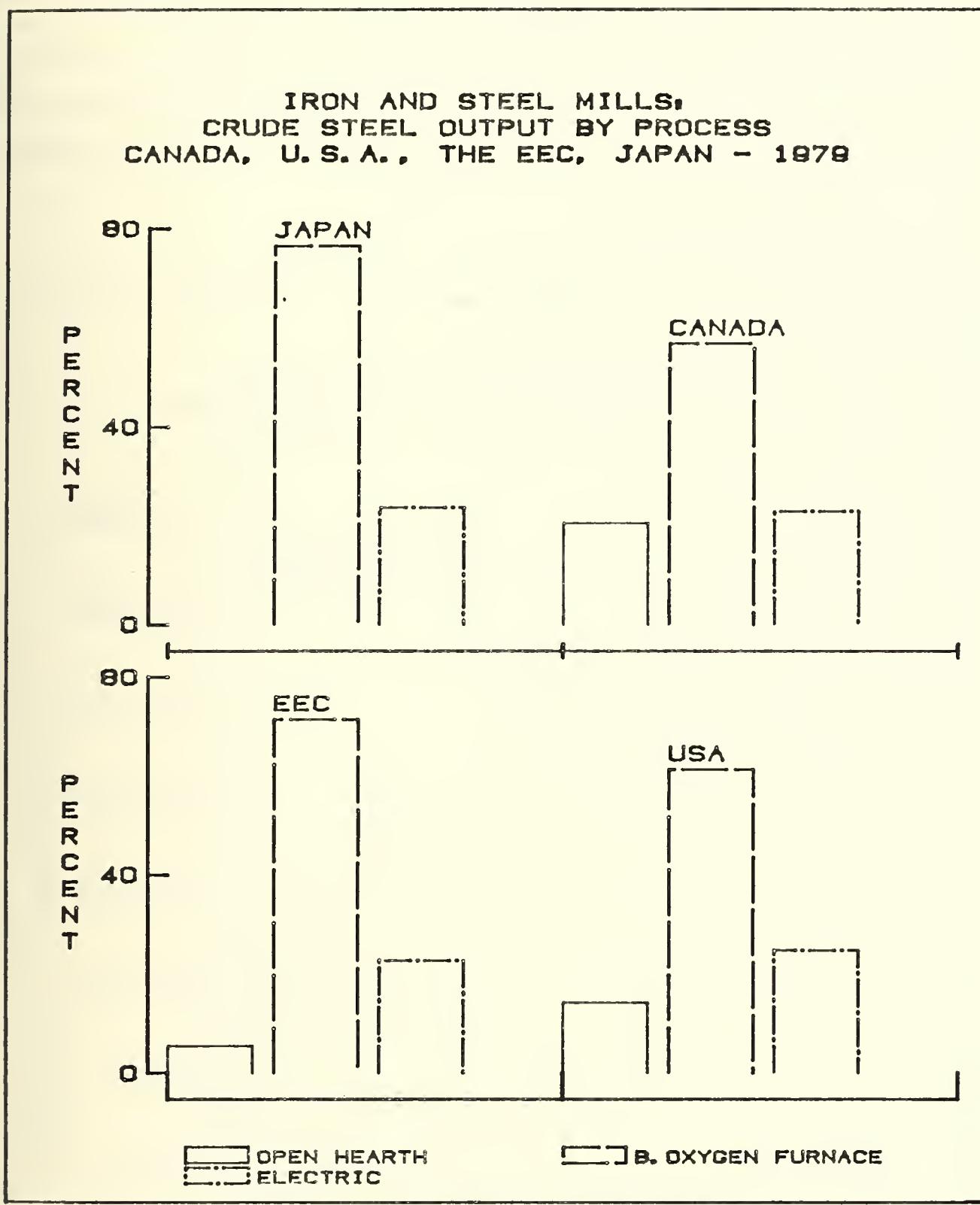
Electric furnace operated plants with a capacity of less than 0.5 million tonnes are generally called mini steel mills. These mills produce selective steel products which are sold in geographically restricted markets usually within a few hundred miles. These mills are more efficient than those of large integrated steel-makers. However, the size of a steel plant is not important, relative to other variables in efficiency determination.

The most efficient commercial integrated steel plants use a basic oxygen furnace to make steel which is continuously blasted. As mentioned earlier, more than 50 percent of the steel-making capacity of Stelco's Hilton works in Hamilton is based on the open hearth process. The open hearth furnaces added in 1961 were considered "obsolete before they (open hearth furnaces) even went into production".¹ In most other developed countries, expansions since the 1960's have involved either the basic oxygen process or the electric process. Even in the United States, all raw steelmaking facilities built since 1957 have involved one of these two processes. Figure 6 shows that in 1979 the Canadian steel industry had a greater reliance on the open hearth process (20.5 percent) compared with Japan (0 percent), the EEC (5.4 percent), and the United States (14.1 percent).

Midland Doherty has estimated that 8.8 man hours are required per ton of steel by the open hearth (OH) process, and the associated labour cost is \$131.50. The basic oxygen furnace requires 7.4 man hours per ton with an estimated cost of \$111. Electric arc furnaces used only 6.5 man hours for a labour cost of \$97.5 per ton of steel. These estimates assume labour cost at \$15 per man-hour. Hourly labour costs are expected to increase substantially after new labour contracts are signed at Stelco. Hence, the dollar differential in the cost of production per ton of steel will increase in the future. As shown previously, the operating income per tonne of steel at Stelco is the lowest of the big three while its capacity to absorb high wage settlements is low. Thus Stelco will have to consider measures to improve productivity and cut costs. One of the most

¹ H. Unger, "American Report", Canadian Business, July 1981, p. 32.

Fig. 6

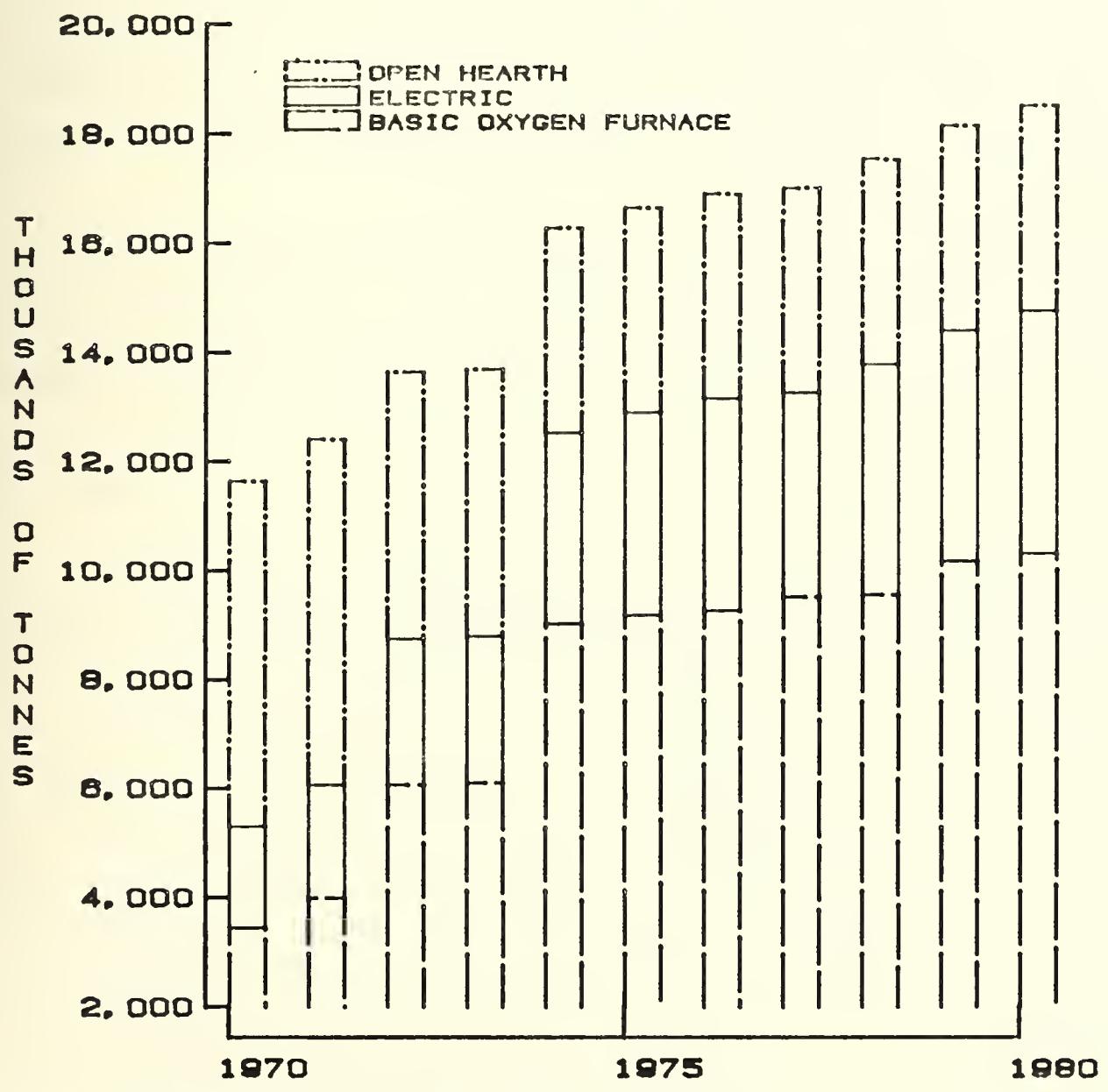


SOURCE: INTERNATIONAL IRON AND STEEL INSTITUTE

logical choices would be a greater reliance on the basic oxygen furnace by phasing out the OH furnaces. Overall, a definite shift towards lesser use of the OH process was evident in Canada between 1970 and 1974. However, since 1975 the proportion of steel produced by the OH process has remained almost unchanged. (See Figure 7)

Fig. 7

IRON AND STEEL MILLS,
PRODUCTION CAPACITY BY PROCESS
CANADA 1970 - 1980



ii) Operating Rate

High operating rates, in the range of 75 to 80 percent of capacity utilization, are absolutely essential for maintaining viable steel operations. The basic strength of the Canadian steel industry is derived from the fact that the operating rates of Ontario steel mills have remained largely in the 88-92 percent range. Occasionally, almost 100 percent of capability utilization is reported by the steel-makers. During the past seven years, steel producers in the EEC have been operating at rates of 50 to 70 percent of capability, reaching only 63.5 percent in 1980. The rate of capacity utilization in the U.S.A. has been in the 75-85 percent range. The importance of high capacity utilization was explained by the President of Dofasco in an address earlier this year. "The real problem in the world steel industry is too much capacity for today's market. This results in low operating rates and profits. A steel plant is very costly to build or expand, and the only way to recover these large investments is to operate the plant at or near full capacity 365 days of the year. For the most part, the Canadian industry has been able to do so...".¹.

In 1980, Canadian steel mills operated at near full capability except for a short duration in summer. In the first six months of 1981, Ontario steel mills have been operating at full capability for all flat rolled products and near capability for long products.

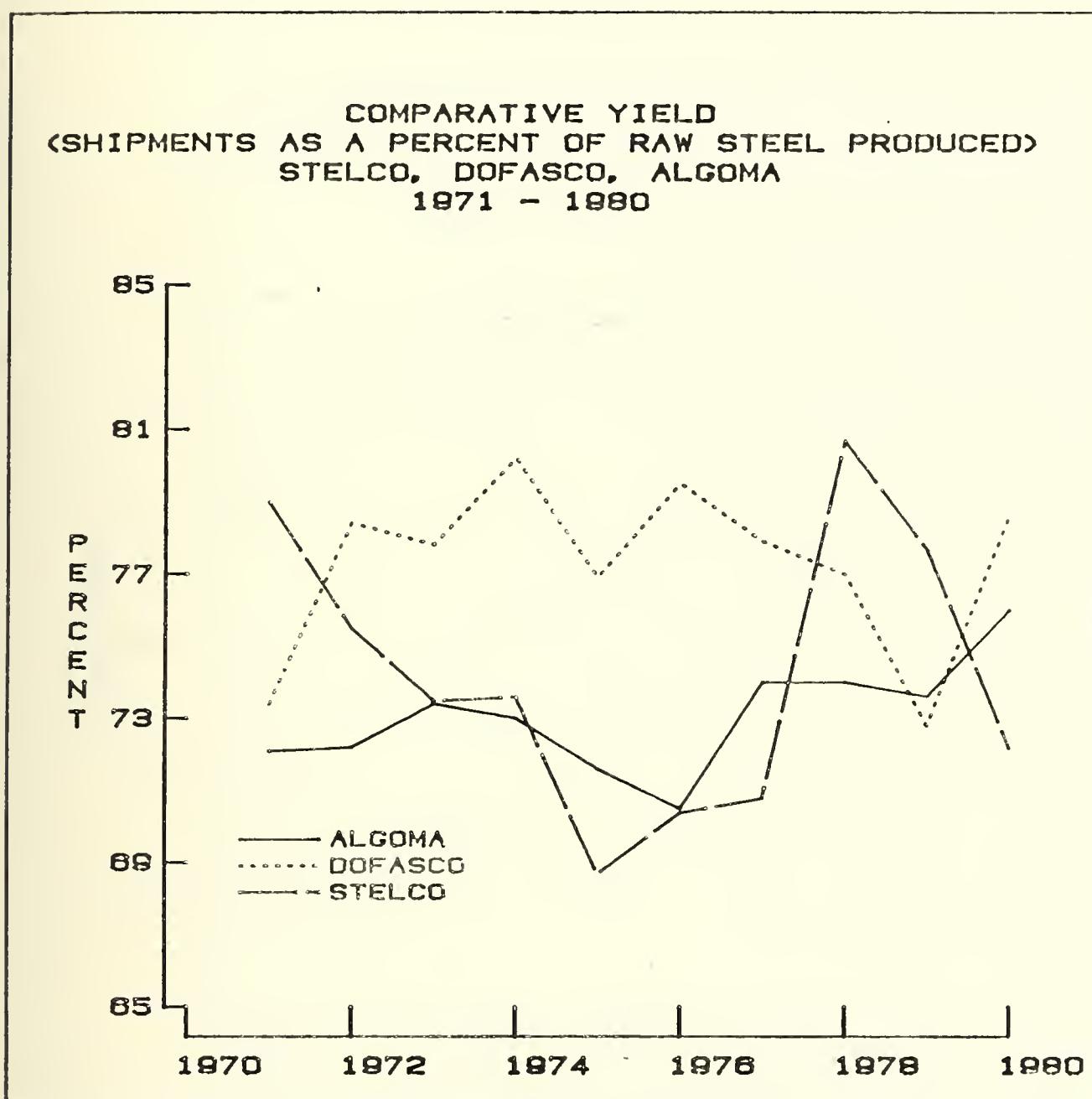
iii) Yield

Yield is the ratio of steel shipped to raw steel produced. It is a measure of utilization. When steel is rolled, split ends are cut off which go into the home scrap pile. According to Algoma, "North American steel industry's overall yield is 71 percent and the Japanese industry's is 86%... In the steelworks (Algoma's), the cost impact of 1% yield represents \$4.6 million per year based upon making less raw steel for the same finished steel, and represents \$6.2 million based upon making and selling more finished steel from the same raw steel."² The yield of the big three steel makers for 1971 to 1980 is shown in Figure 8. Algoma's average yield improved from 72.1 percent in 1971 to 76 percent in 1980, placing it second after Dofasco. In terms of 10 year average yield, Algoma is third after Dofasco and Stelco.

¹Algoma Steel, Annual Meeting, Technical Session, April 20, 1981, p. 3

²Ibid.

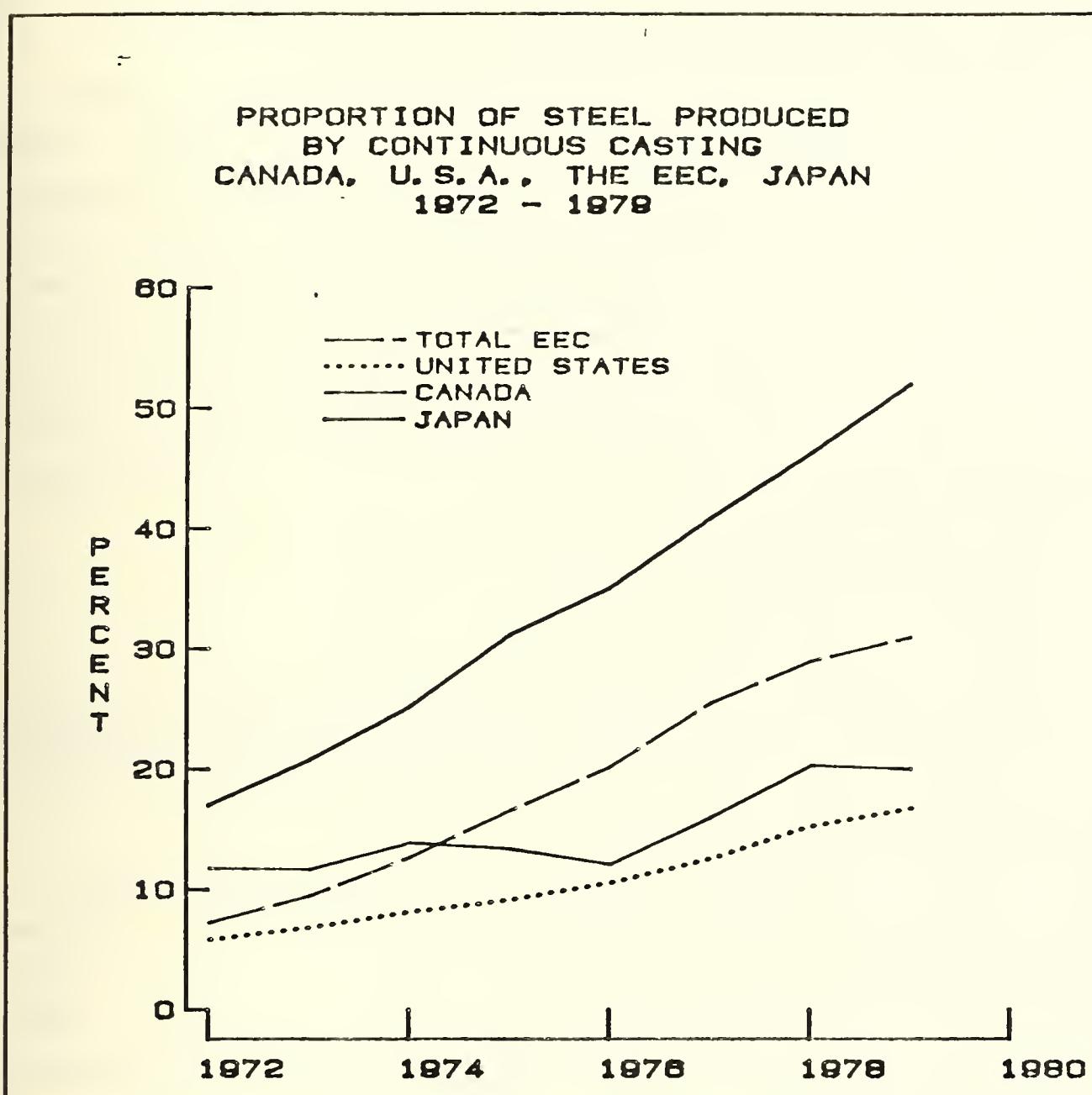
Fig. 8



SOURCE: STELCO DOFASCO ALGOMA ANNUAL REPORTS

By international comparison, apparent yield in Canada and the United States is low. For example, apparent yield usually reaches 90 percent in Japan, 81 percent in West Germany, 84 percent in France and 82 percent in Brazil. One explanation of this phenomenon is that these countries make a greater utilization of continuous casting, a process which helps to improve yield by as much as 10 percent. The Japanese steel industry in 1980 casted more than 60 percent of their steel by the continuous caster. The EEC ranked second at 30.9 percent in 1979, while Canada at 19.9 percent was barely above the United States at 16.7 percent (See Figure 9).

Fig. 9



SOURCE: INTERNATIONAL IRON AND STEEL INSTITUTE

During the past few months, many U.S. steel-makers have announced their plans to make large investments into continuous casting facilities. The Japanese have indicated that they would like to cast all their steel by continuous casters, but some products, which represent about 10 percent of the markets, do not respond well to continuously casted steel.

(iv) Raw Materials

The steel industry consumes large quantities of iron ore, coal, energy and lime. The cost of these raw materials can differ substantially between countries. Also, depending on the process used, the amount of materials required per ton of steel may differ significantly. Canadian steel-makers have direct ownership of iron ore and coal mines. Thus all mining related increases in cost are to be absorbed by the steel operations. The Japanese buy their iron ore and coal in competitive world markets. In open markets, steel operators can buy from the least-cost supplier. Table 16 shows the cost of selected material input.

**COMPARATIVE COST OF PRODUCTION FOR
INTEGRATED PRODUCERS, SELECTED COUNTRIES, 1976
(\$U.S. Per Metric Tonne of Molten Steel)**

Table 16

<u>Raw Materials</u>	<u>Canada</u>	<u>U.S.</u>	<u>Japan</u>	<u>EEC</u>
Iron Ore	36.66	37.07	27.15	36.28
Scrap	9.98	10.78	10.51	10.32
Total	46.64	47.85	37.66	47.10
Total Energy	47.46	47.54	52.93	53.20
Labour	57.20	67.21	31.45	47.47
Total Operating Costs (includes other materials)	195.80	207.10	176.04	197.17
Total including depreciation & other costs	306.69	307.98	253.69	288.91

Source: D.F. Barnett, Comparative Costs Among World Steel Producers, April 1978.

a) Iron Ore

Generally, one tonne of raw steel production requires about 1.5 tonnes of iron ore. Most iron ore requirements of the big three are met by their captive mines. All four of the operating iron ore mines in Ontario are captive to the big three steel makers. (See Table 17)

IRON ORE MINES IN ONTARIO

January, 1981

Table 17

Mine	Location	Output			
		Employment	(Tonnes)	Owned by	Operated by
Adams Mine	Kirkland Lake, N.E. Ontario	454	1,043	Dofasco	Cliffs of Canada ¹
Sherman Mine	Temagami, N.E. Ont.	477	907	Dofasco	Cliffs of Canada
Algoma Ore	Wawa, N.E. Ont.	755	1,524	Algoma	Algoma
Griffith Mine	Bruce Lake near Red Lake N.W. Ontario.	491	1,524	Stelco	Pickands Mather Co. ²

¹Wholly owned subsidiary of The Cleveland Cliffs Iron Co. of Cleveland Ohio

²Pickands Mather & Co. of Cleveland, Ohio.

Source: Company Annual Reports, and Northern Miner Press Ltd,

Canadian Mines Handbook 1981-82.

These four mining operations directly employ almost 2,200 persons. Since the product from these mines is shipped directly to iron and steel mills in Ontario, additional employment benefit in transportation remains solely in Ontario.

In 1979, overall consumption of iron ore by Canadian steel mills was 16.875 million tonnes.¹ In 1980, the big three consumed 13.6 million tonnes, of which about 37 percent came from their captive mines in Ontario. The remainder came largely from captive mines in Labrador and the United States. (See Table 18)

IRON ORE SOURCING IN 1980:
ALGOMA, DOFASCO, STELCO

Table 18

<u>Company</u>	<u>1980 Requirements (Million Tonnes)</u>	<u>% From Ontario</u>	<u>% From Captive Mines¹</u>
Algoma	4.2	36	93
Dofasco	4.1	48	80+
Stelco	5.3	29	90+

¹Captive mines are in Ontario, Labrador and the U.S.A.

Source: Company Annual Reports, 1980, and Northern Miner Press Ltd., Canadian Mines Handbook, 1981-82.

It may have been beneficial for Canadian steel mills to own their raw material sources, especially in terms of assured supply and a reasonable predictability of costs. In the past few years, wage settlements at iron ore operations in North America have been high, and so the cost of iron ore increased substantially. Canadian steel companies were forced to absorb the cost increases. This is partially offset, however, by generous exploration and mine development related write-offs for such work done in Canada. Thus, the costs given in Table 16 are not definitive.

¹AISI, Annual Statistical Report 1980, Table 51.

The Comptroller General of the United States in the 1981 report to the Congress (GAO report) states: "The world market price of iron ore has been significantly less than the domestic producers' self-supply cost in the 1970's... U.S. producers actually paid more for iron ore in 1979 than producers in countries with heavier iron ore imports".¹ Table 4-1 in the report shows that the 1979 average cost of iron ore per ton in the United States was \$30.37, compared with \$21.76 for West Germany, \$19.19 for U.K., and \$21.55 for Japan. Generally the cost of iron ore in Canada and the U.S.A. is similar, however, "Iron ore costs per ton of finished steel were estimated to be about 7 percent lower in Canada in 1979 at prevailing exchange rates.² The exchange rate of the Canadian dollar at the time of the report was \$0.86 (U.S.), while on August 22, 1981, it was \$0.83 (U.S.). Thus, Canadian steel-makers should have a 10 percent cost advantage in iron ore.

Ontario has vast reserves of iron ore, most of which are under the control of the steel-making firms. Canadian tax laws encourage manufacturing companies to explore and develop mineral deposits in Canada. For every three dollars of expenditures in exploration and development, four dollars can be written off. As a result Algoma, Dofasco and Stelco contracted a study by Pickands Mather and Co. to evaluate potential iron ore deposits in north western Ontario, and to determine whether or not a major iron ore pelletizing complex on Lake Superior, fed by a slurry pipeline, is worthy of detailed investigation. The report was completed in January, 1979, concluding that because of a glut of iron ore in the Great Lakes region it is uneconomical to develop these properties. When it does become economical, the Lake St. Joseph property will likely be the first to be developed.

Iron ore competes with scrap as a feed for steel production. The composite price of scrap in 1980 was \$89.40, down from \$97.50 in 1979. (Price in U.S. dollars per long ton No. 1 heavy melting) Stelco's Griffith mine was affected by the low price of scrap and, consequently, its direct reduction kiln is out of operation.

¹U.S. Comptroller General's Report to Congress, New Strategy Required for Aiding Distressed Steel Industry. Jan. 8, 1981 (GAO Report) p. 4-1.

²Gordon Securities, The Canadian Steel Industry: Basic Report, Nov., 1980 p. 18

b) Coal/Coke

Metallurgical coal is another major basic ingredient for an integrated steel-maker. The coal is converted to coke in coking ovens before it can be used as a feed with iron ore in the blast furnaces to make iron. The amount of coal required per tonne of steel depends upon the coke requirements, the blast figures, and the efficiency with which coal can be converted to coke. Canadian coke oven batteries and blast furnaces are considered to be more efficient than those in the United States. For example, in 1979 the coal required per ton of raw steel produced was 0.434 tons in Canada, compared with 0.509 tons in the United States, a difference of 15 percent.¹

Canadian mills buy about 60 percent of their coal requirements from captive mines in the United States.

- o Stelco obtains 40-60 percent of its coal requirements from mines in which it has equity interest. At present, Stelco has direct interest in Pikeville coal company which owns Chisholm Mine in Kentucky. In addition, the Stelco Coal Company of Pittsburg, Pa. (a wholly owned subsidiary) owns 100 percent of Kanawha Coal Company which owns the Madison Mine in West Virginia. This mine has a rated capacity of 544,000 tonnes. The Chisholm mine and the Madison Mine combined have a capacity of 1.451 MMT of coal annually, representing approximately 47 percent of the 1980 coal requirements of Stelco. The Stelco Coal Company also has 10-13.5 percent interests in two other coal mines in West Virginia and one in Pennsylvania.
- o Dofasco also gets all its coal from the United States, however, only a small percent of its requirements are met by mines in which the company has a minority ownership. In 1980, Dofasco used 1.63 million tonnes of coking coal. Ten percent of it came from its interest in the Itmann Coal

¹In 1979, Canadian Mills consumed 7,688,000 tons of coal and produced 17,723,000 tons of raw steel. In the United States, 69,437,000 tons of coal was used, while 136,341,000 tons of raw steel was produced. When raw steel from electric furnaces (which do not use coal) is excluded, 0.562 tons of coal was needed per ton of raw steel produced in Canada, compared to 0.678 tons in the U.S., a difference of 17 percent. (Source: AISI, Annual Statistical Report, 1979.)

Company, West Virginia. (This coal is low volatile coal and represents about 35 percent of the need for such coal. High volatile coal requirements are about three times that of the low volatile variety. It is purchased by long term contracts in open markets.) In 1980, 65 percent of the coal obtained by Dofasco was under long term contracts. The remaining 25 percent was bought in the open market. Dofasco estimates that its need for coal in 1981 will decline about 5.5 percent from the 1980 level to 1.54 million tonnes. This is expected to be achieved by greater efficiency in coke production and in the blast furnaces.

- o Algoma's captive mines provide almost all of its coal requirements. In West Virginia, Cannelton Industries, Inc. operates three coal-producing mines. In addition, Maple Meadow Mine produces low volatile coal. Algoma production of low volatile coal is greater than its requirements. In 1979, Algoma sold 295,000 tonnes of this type of coal. However, Algoma purchases of high volatile coal balanced the overall requirements.

Two of the greatest concerns on the coal front are, firstly, the potential of supply disruptions due to strikes either at the mines or in the transportation network, and secondly, the rapidly rising cost of coal. Between 1966 and 1976, the per ton cost of steel produced in the U.S.A. increased by 10.03 percent per annum (from \$113.21 in 1966, to \$294.65 in 1976) while the cost of coking coal increased at the rate of 18.32 percent per annum (from 9.99 to \$53.73). This rate of growth is faster even than that of fuel oil, which increased at 16.0 percent per annum.¹

The cost of coal in Canadian steel-making operations is about 70 percent of total energy costs. Algoma reported that 1980 energy costs were 22 percent of the total manufacturing costs. The 1980 energy bill for Algoma was \$209 million, and it is expected to rise to \$460 million by 1985.

It is for reasons such as these that the Japanese steel-makers have taken drastic measures to reduce the cost of coal per ton of steel. Canadian steel

¹ OTA Report, p. 141.

mills report a saving in this component of 5-10 percent over the 1975-1980 period, and efforts are continuing to promote more efficient utilization of coal as a source of energy.

The magnitude of potential energy savings in the steel sector is immense. The Province of Ontario could initiate an evaluation program of efficiency in energy consumption by the steel industry and promote conservation. This would not only reduce our reliance on imported coal, but would encourage Ontario steel mills to develop energy saving technologies which can be marketed abroad. Provincial involvement in this area would be consistent with an overall

and cannot be considered reliable. This lack of reliable sources prompted the U.S. government, under its program for the stockpiling of strategic materials, to hold an inventory of 203,690 tonnes of tin as of November 1980. Canada, however, has no such plans.

- ~
- o Much of the manganese is converted to ferromanganese for use in the production of steel. In 1980 Russia, China and South Africa provided over 67.6 percent of the total world production of manganese. Brazil and Gabon produced another 13.4 percent, for a total of 81 percent between these five countries. U.S. experts feel concerned about continued and reliable supply from these countries and thus has an ongoing program of stockpiling.

In Canada, there is no program of stockpiling of strategic materials. It is not suggested that such a program is needed, but it seems essential that a study be undertaken to determine the vulnerability of the Ontario manufacturing sector to interruptions in the supply of imported materials of strategic importance, and to determine how best to protect against such interruptions.

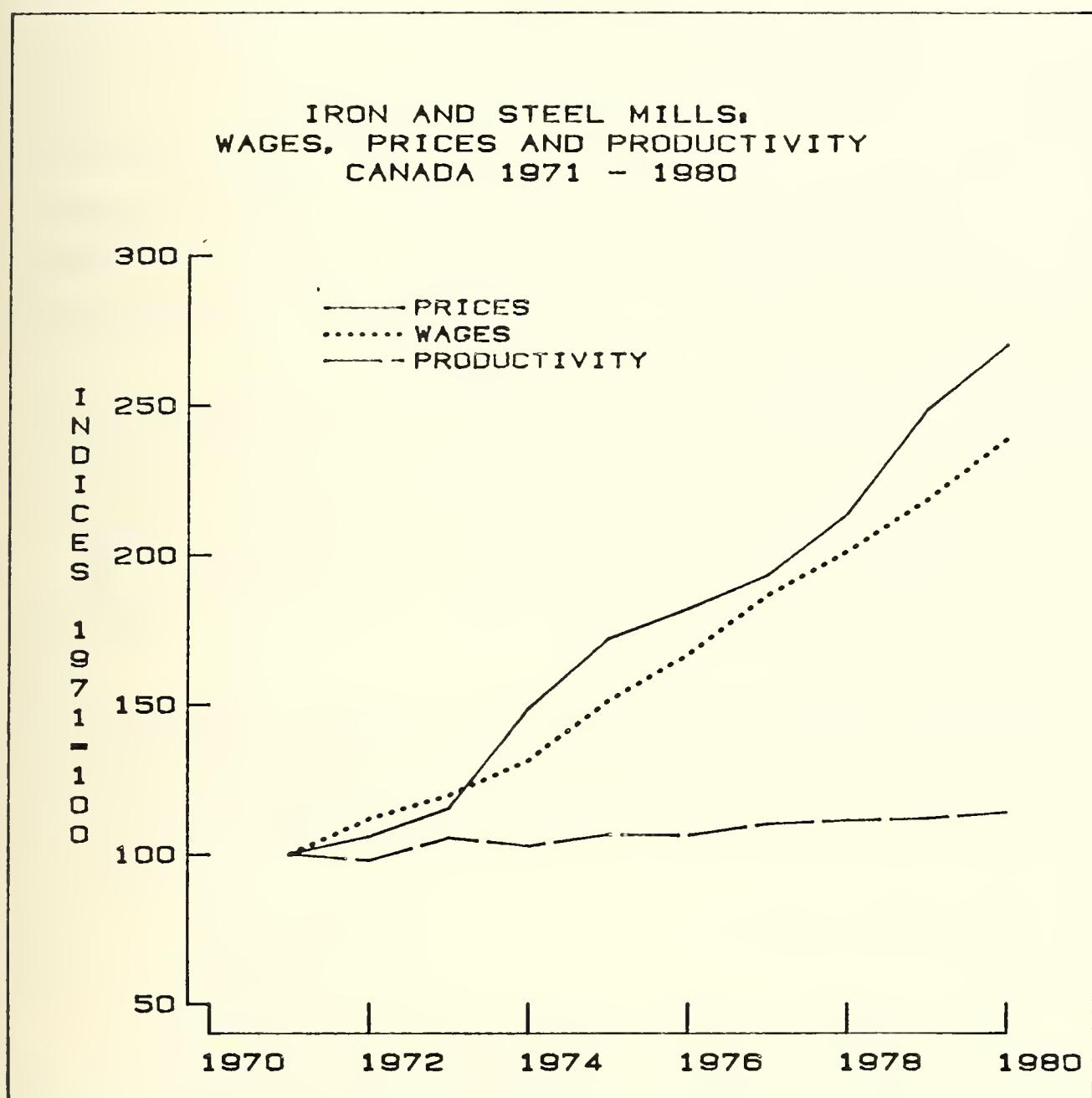
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v) Employee/Employer Relationship & Productivity

Employee wages and the cost of materials consumed by the steel industry have been rising sharply since 1970. The index of wages increased from 100 in 1970 to nearly 240 in 1980, as illustrated in Figure 10. However, the index of productivity made only negligible gains.

Fig. 10



SOURCE: STATISTICS CANADA

A more subjective component of efficiency is the state of employee-employer relations. In two of the big three steel companies, this relationship is poor. The current strike at Stelco provides an example. The Japanese steel industry, however, has taken positive measures to improve its worker relations. These measures include Jishu Kanri activities which emphasize productivity and product quality. (Further details of Jishu Kanri are found in Appendix F.) Respecting the opinions of employees makes them feel an integral part of the operations, narrows the gap between workers and management, and allows suggestions to flow more easily in an improved working environment. Analysis of the relationship between the quality of the working environment and employee attitudes is not possible in this study. However, observations on turnover rates, absenteeism, and worker suggestions to the company are discussed below. Algoma is excluded from review because its location in a one-industry city like Sault Ste. Marie means that its workers lack the degree of mobility that is available to workers in Hamilton, which has a large diversified economic base and is located near to Toronto.

- o Turnover rate was lower at Dofasco. In 1979, Dofasco had a turnover rate of 7.15 percent among plant employees including retirements, deaths and exits from the work force. The main probelm with the use of turnover rate as a measure of employee attitude is its wide fluctuation. The Dofasco turnover rate was only 6.5 percent in 1977, but was 14 percent in 1974.
- o Absenteeism: In 1980, the Dofasco plant lost 3.7 percent of its total man days because of absenteeism by hourly employees. In comparison, "At any one time at Stelco, 10 per cent of the work force is off for one reason or another."¹

¹ Dr. F. D. Fraser, as quoted by Virginia Galt in Globe & Mail, October 1, 1981. Dr Fraser also suggested that the absentee statistics reflect the atmosphere of confrontation between Stelco and its unionized workers.

- o Suggestions: This is one area where the difference between Dofasco and Stelco is absolutely striking, as shown in Table 19. Dofasco's plant employees submitted over 5,000 suggestions in 1980, whereas Stelco, with a much larger work force, received only 1,100 suggestions. This translates to a suggestion rate per 100 workers of 65.8 at Dofasco, and 8.7 at Stelco.

**SUGGESTIONS BY EMPLOYEES
AT STELCO AND DOFASCO, 1980**

Table 19

	<u>Dofasco</u>	<u>Stelco</u>
Staff in Suggestions Department	7 man years	1.5 man years
Hourly Employees(Hamilton only)	8,800	12,600
Suggestions Staff Per 1,000 employees	0.795	0.119
Number of Suggestions Received	5,000	1,100
Suggestions per 100 employees	65.8	8.7

Source: Dofasco, 1981

It is too early to determine whether the fact that Stelco workers are unionized while those at Dofasco are not has any bearing on this issue. However, it would be interesting and worthwhile in the future to evaluate the relationship between worker attitude and productivity.

vi) Research and Development

The North American steel industry has been extremely conservative in the research and development area and slow in the adoption of technological advancements in use abroad. The steel industry world-wide benefitted particularly from the introduction of the basic oxygen furnace (BOF) for steel-making to replace the old open hearth (OH) furnace. Dofasco pioneered the BOF process in North America in 1954. All new steel mills built in the world utilize the BOF process. Even in the United States the last OH furnace was installed in 1957. Stelco, however, installed an OH furnace in 1961. As a result of in-house improvements, it is considered one of the best of its kind.

However, it still is not as efficient as the BOF Process or fast enough to feed continuous casters if they were installed.

The major criticism of the industry revolves around the fact that too few resources are employed in R & D. The Canadian Steel Industry Research Association in its only report concluded, "It should be noted, however, that it (Canadian Steel Industry) does not spend as much money on R & D as many of its international competitors, but often utilizes technology developed by others for which it pays royalty."¹

The biggest drawback of reliance on foreign technology is described in the report of the Office of Technology Assessment of the U.S. Congress (OTA): "Whatever new technology is purchased from foreign sources (it) still leaves the purchaser one step behind the originator. By the time all is learnt about the innovation, the foreign source is well on its way to exploiting the next one."²

The Canadian steel industry's expenditures on R & D in 1980 were only \$16.3 million, representing only 1.9 percent of the total manufacturing R & D expenditure of \$849.9 million. Yet, the industry accounts for 4.5 percent of the total value added in manufacturing.

Total manpower committed by the Ontario steel industry towards R & D is shown in Table 20. It reveals the relative domination of this field by Stelco and Dofasco. Algoma's R & D employment appears particularly low for its size. The mini-mills account for some 13 percent of total R & D employment by the steel industry in Ontario. This is large relative to their share of total industry output, however most of this R & D staff is employed by Atlas Steels.

Despite low R & D expenditures, many patents have been taken by the steel industry - none of which have been major breakthroughs. However, Stelco recently invented and patented a major development in hot strip rolling technology involving the use of a coilbox which coils hot steel between rolling operations, thereby conserving heat for subsequent rolling. The coilbox has been licenced for use in hot strip mills elsewhere in Canada, Australia, Sweden,

¹ CSIRA, The Canadian Steel Industry Fact Book, April 1980.

² OTA Report, p. 269.

the Netherlands and West Germany. In addition, the company's early development of the Stelco process for rod manufacture has been exported to over 100 locations. Active government support of R & D specifically tailored for the steel industry will be quite beneficial to the long term health of our economy. This research could be along the same lines as the geophysical research-related grants provided by the Ministry of Natural Resources.

**ONTARIO'S STEEL INDUSTRY:1978 - 1979
EMPLOYMENT IN R & D
(Man-Years)**

Table 20

Company	<u>1978</u>	<u>1980</u>
1. Stelco	121	124
2. Dofasco	87	90
3. Algoma	14	18
Total-Integrated Producers	<u>222</u>	<u>232</u>
4. Atlas	12	12
5. Burlington	5	5
6. IVACO	2	3
7. LASCO	2	2
Total-Mini-Mills Producers	<u>21</u>	<u>22</u>
Total-Ontario Steel Industry	<u>243</u>	<u>254</u>

Source: CSIRA, The Canadian Steel Industry Fact Book, April 1980, p.2, and IISI, Steel: Statistical Yearbook (International Iron and Steel Institute, Brussels, 1980) pp. 2-3.

vii) Dofasco Operations

Dofasco is the second largest steel producer in Canada. It is well respected in the North American steel industry as being one of the most progressive companies and is well known for its excellent planning and marketing operations.¹ Dofasco was the first steel mill in North America to introduce Basic Oxygen Furnace technology. While the theory of this process had been known for a long time, it only became commercially viable a little

¹ Gordon Securities Investment Research, Basic Report: Dofasco Inc., November 1980

over 30 years ago. Dofasco, like the other two big steel companies, is over 95 percent Canadian-owned.

Dofasco is the second largest employer of steel workers in Canada. Unlike Stelco and Algoma, its workers are non-unionized. Its employees thus pay no union dues, yet they get all the benefits paid to comparable workers at Stelco. As of June 10, 1981, Dofasco employed some 12,688 persons at its plant in Hamilton.

Dofasco's major subsidiary interests are in:

- o National Steel Car Limited, a wholly-owned subsidiary also based in Hamilton. It manufactures railway rolling stock, industrial and mining specialty rail cars and car parts. National Steel contributed about 12 percent to Dofasco sales revenues in 1979;
- o Prudential Steel Limited, a wholly-owned subsidiary located in Calgary. It manufactures electric weld, small diameter pipe (2" to 10"), tubing and casing for the oil and gas industry, and hollow structural steel for agricultural and industrial uses;
- o Beachvilime Limited, a wholly-owned subsidiary based in Beachville, Ontario. This company provides lime and limestone products to Dofasco and other users. A wholly owned subsidiary of Beachvilime, Guelph Dolime Limited, produces dolomitic lime;
- o Adams Mine in Kirkland Lake and Sherman Mine in Temagami. Dofasco possesses part-ownership in these iron ore mines, both of which are discussed in the raw material section.
- o Baycast Limited, a Hamilton firm jointly owned by Dofasco and Stelco. Baycrest produces prepainted steel for office furniture and appliances.

Production Facilities and Plans

Dofasco operates two basic oxygen steel-making plants. Shop 1 has three furnaces with a total capacity of 2.7 million ingot tonnes. Shop 2, with a capacity of 1.0 million tonnes per annum was completed in 1978.

Red hot ingots from the oxygen furnaces are trucked in insulated trailers to rolling mill area soaking pits, (large pits with gas burners to heat ingots to a uniform temperature of 2,250°F suitable for rolling). Dofasco's rolling mill is technologically advanced. Here ingots are rolled into slabs which are further rolled in two hi hot rolling mills.

Dofasco has adequate cold rolling capacity. Cold rolled steel is further processed to make galvanized and tin plated steels. On June 23, 1981, Dofasco announced that it will convert one of its galvanizing lines to produce 'galvalume' ie. steel coated with an alloy of aluminum and zinc. Thus Dofasco will be the only Canadian steel-maker licensed by Bethlehem Steel of the U.S. to manufacture and market this new product line in Canada. The shifting of one line to Galvalume, however, will not reduce the number of galvanizing lines.

Dofasco's capital expansion projects include:

- o A new galvanizing line which started production in August 1981. With the addition of this line (costing \$4.9 million), Dofasco can produce up to 816,500 tonnes per year of finished coated steel. Overall, Dofasco's capacity has increased by 35 percent. However, due to a shortage of rolling capacity this coating capacity will be underutilized for about 2 years;
- o A new pickle line costing \$90 million;
- o The construction of a \$450 million hot strip rolling mill which is scheduled to start production in mid-1983. To keep pace with market requirements the new mill can be expanded in stages, at moderate expansion costs, from its initial capacity of 1.1 million tons to 4.0 million tons. It represents Dofasco's largest single expansion project;
- o A planned expansion program to increase raw steel capacity to 4.1 million tonnes.

During the past five years, Dofasco has made capital expenditures of \$666 million whereas the net income for this period was only \$490 million. At 1980 year end, capital projects worth \$488 million were approved.

Dofasco's major problem to be faced in the near future is that its production capacity by 1985 will be limited by its blast furnace capacity. Considering 2-3 years lag between the time the decision is made to expand and the actual start-up date, Dofasco must decide within the next 12 months whether to increase its blast furnace capacity.

Financial and Operating Results

Raw steel production by Dofasco in 1980 was 3,339 million tonnes, representing an increase of percent 50 over 1971 production of 2,239 million tonnes. (See Table 21) The yield rate at Dofasco rose from 73.4 percent in 1971 to 78.6 percent in 1980, the highest rate of 80.2 percent having been achieved in 1974. Dofasco's operating income per tonne, at \$80.83 in 1980, was a record high for the firm, and the highest among the big three in that year.

DOFASCO INC.
PRODUCTION AND YIELD, 1971-1980

Table 21

Year	Raw Steel				Operating Income (\$000's)	Operating Income/Tonne
	Production (000's Tonnes)	Shipments (000's Tonnes)	Yield ¹			
1971	2,239	1,643	73.4	80,283	\$ 35.87	
1972	2,516	1,973	78.4	102,746	\$ 40.84	
1973	2,754	2,143	77.8	125,182	\$ 45.46	
1974	2,776	2,227	80.2	143,629	\$ 51.74	
1975	2,769	2,130	76.9	128,961	\$ 46.57	
1976	3,026	2,406	79.5	154,032	\$ 50.90	
1977	3,024	2,355	77.9	158,356	\$ 52.37	
1978	3,255	2,507	77.0	215,069	\$ 66.07	
1979	3,683	2,683	72.8	297,191	\$ 80.69	
1980	3,339	2,623	78.6	269,903	\$ 80.83	

¹ Shipments as a percent of tonnes produced.

Source: Dofasco, Annual Reports.

Sale revenue, as show in Table 22, were \$1,542 million in 1980 , up 7.4 percent from the 1979 record sales of of \$1,435 million. Net income, however, declined 10.7 percent during the year in spite of a general price increase of 8.1 percent.

**DOFASCO INC.
FINANCIAL AND OPERATING RESULTS,
1976 to 1981 Q2
(\$ millions, except shipments)**

Table 22

	First 6 Months						
	<u>1981</u>	<u>1980</u>	<u>1980</u>	<u>1979</u>	<u>1978</u>	<u>1977</u>	<u>1976</u>
Shipments (000 ton)	1,449	1,496	2,891	2,958	2,760	2,600	2,650
Sales	855	790	1,542	1,434	1,120	919	905
Pre-tax Income	137	116	194	219	139	90	96
Net Income	85	71	122	137	95	69	67
Capital Expense	119	77	186	72	134	160	114

Source: Dofasco, Annual Reports, and Financial Post Data Base

Dofasco's shipments in the first six months of 1981 were about 3 percent below those for the comparable period in 1980. This is not cause for major concern, however, because a much more dramatic fall in steel shipments in the second quarter of 1980 (which led to a brief plant shutdown at mid-year) was followed by an extended period of near full capacity as orders improved significantly. So far in 1981, Dofasco's plants are operating at full capacity and the steel produced is being delivered on an allocation basis (rationed). The fourth quarter outlook, in terms of steel shipments, is somewhat clouded because of unsettled events at Stelco. Measures of Dofasco's expected operations to 1982, as estimated by Gordon Securities, are listed in Table 23.

DOFASCO INC.
SUMMARY OPERATIONS ESTIMATES,
1981-82

Table 23

	Actual	Est	Est
	<u>1980</u>	<u>1981</u>	<u>1982</u>
Total Shipments (000 tons)	2,891	2,900	2,950
Domestic Sales/Ton (\$)	469	534	597
Export Sales/Ton (\$)	441	550	615
Total Sales/Ton (\$)	468	536	598
Employment Cost/Ton (\$)	127	147	164
Energy Cost/Ton (\$)	26	31	37
Raw Material Cost/Ton (\$)	228	251	276
Operating Cost/Ton (\$)	381	429	476
Operating Profit/Ton ¹ (\$)	83	107	122
Pre Tax Net Income (\$ Millions)	194	244	290

¹The operating income per ton for 1980 as reported by Gordon Securities because of the methodology. Our figures are based on operating income per tonne of raw steel produced whereas Gordon Security calculates it on the basis of operating income per ton (net) of shipments.

Source: Gordon Securities, 1980.

In 1981, the performance of one of Dofasco's major subsidiaries, National Steel Car (NASCO) is not expected to keep up with those of previous years. In 1980, NASCO contributed approximately \$200 million to Dofasco's sales, but it is expected to drop 20 percent to \$160 million in 1981. Operating profit from NASCO this is expected to be about \$20 million, down 33 percent from the 1980 level. However, the decline will be more than offset by Dofasco's earnings from steel operations.

viii) Stelco Operations

Stelco, the largest and the most diversified steel-maker in Canada has its principal facilities in Hamilton. After six years in construction and three years of delays, Stelco's Lake Erie works started production in June 1980, when the first continuously cast slab rolled off its mill. Lake Erie steel mill is the first major greenfield plant built in North America in about two decades. Stelco's major production facilities include:

- o Hilton works at Hamilton, almost next door to the Dofasco plants. The annual steel capability at the Hilton works is 4.75 million tonnes, accounting for 27.5 percent of total Canadian steel-making capability. A strike by unionized workers this plant continues (as of October 8), with preliminary negotiations just commencing;
- o Lake Erie works near Nanticoke on the north shore of Lake Erie had a capacity of 751,150 tonnes on January 1, 1981. Steel is made by basic oxygen furnace and continuously casted (see Appendix D);
- o Two small steel mills, one each in Quebec, (McMaster Works in Contrecoeur) with a rated capability of 254,000 tonnes, and Alberta, (Edmonton Steel Works, Edmonton) with a capability of 265,000 tonnes;
- o Several finishing plants in Ontario, some of which are located in Brantford, Toronto, Gananoque, Burlington and Welland.

Overall, Stelco represents 35 percent of Canadian steel-making capability, or 40 percent of Canadian steel-making capacity. In addition, the company manufactures large diameter pipe (up to 60" in diameter) having a total capacity of 907,000 tonnes. Their interests in raw material sources are also quite extensive, as already discussed in section (iv) of this chapter.

Future Plans

-

The continuous casters at Stelco's Lake Erie works have a capacity of 1.2 million metric tonnes. This capacity is not fully utilized because of inadequate rolling capacity at the Hilton works where the blast furnace has a capacity of 2.5 million tonnes of iron. Future plans include:

- o construction of a hot strip mill, with a capacity of 1.2 million tonnes, by mid-1983;
- o expansion of the hot strip mill to 2.3 million tonnes by 1985;
- o construction of another continuous slab caster, with a capacity of 1.5 million tonnes, by 1985;
- o possible expansion of capacity at the Lake Erie works to over 5 million tonnes by 1990.

Labour

At the end of 1980, almost 90 percent of Stelco's labour force was employed in Ontario with the remainder located in Quebec and Western Canada.

Within Ontario, the Hilton works in Hamilton are the largest in terms of employment. About 12,500 of the workers are hourly employees represented by local 1005 of the United Steel Workers of America Union. Stelco's operations were shut down on August 1, 1981 due to a strike at all plants. However, the strike has been resolved at most plants with the notable exception of the Hilton works and two finishing plants. The Minister of Labour took an unusual step in appointing a high level, three man mediation team including Mr. Pathe, A.D.M., Ministry of Labour; Mr. Riggan, V.P., Noranda and Mr. Pirkey, President, Ontario Federation of Labour.

The continuing strike at Stelco has resulted in a drastic reduction in the supply of steel in an already tight domestic market. Total Canadian production of raw steel for the week ending August 15, 1981 was 196,536 tonnes compared with 368,969 tonnes for the week ending July 4, 1981.

The weekly earnings of the employees who are still on strike are over \$6 million. The loss of these earnings, along with other linkages, can create quite an adverse impact on Hamilton's economy if the strike continues for a considerable duration.

-

Many observers feel that the strike at the Hilton works will be a long one. Settlements at other locals are expected to increase the resolve of the hardliners to prolong the strike in an attempt to gain a better package than that obtained by the locals where settlement has been reached. Whatever the duration of the strike or the terms of the settlement, the cost of producing steel at Stelco will rise significantly. As mentioned earlier, operating margins per tonne of steel are the lowest at Stelco relative to Algoma and Dofasco. The additional drain on the limited resources of the company will weaken Stelco's capacity for future capital expansions. Moreover, Dofasco is likely to match the benefit package and the higher cost of steel production will be reflected in its prices.

Raw steel production by Stelco in 1980 was 5,695,000 tonnes, up 34 percent from 1971 production of 4,239,000 tonnes. (See Table 24) Total steel shipments over this period increased by only 23 percent, indicating a drop in the yield rate. In effect, the apparent yield rate in 1980 was 72.2 percent, down 8.5 percentage points from the peak rate of 80.7 percent in 1978, and 6.8 percentage points below the 1971 rate. Operating income per tonne at Stelco was the lowest among the big three in 1980.

**STELCO INC.
PRODUCTION AND YIELD, 1971-1980**

Table 24

Year	Raw Steel			Operating Income (\$'000's)	Operating Income/Tonne
	Production (000's Tonnes)	Shipments (000's Tonnes)	Yield ¹		
1971	4,239	3,347	79.0	154,257	\$ 36.39
1972	4,564	3,445	75.5	137,668	\$ 30.16
1973	5,192	3,814	73.5	195,781	\$ 37.71
1974	5,028	3,700	73.6	222,966	\$ 44.34
1975	4,895	3,362	68.7	183,802	\$ 37.55
1976	5,193	3,654	70.4	179,449	\$ 34.56
1977	5,117	3,624	70.8	171,774	\$ 33.57
1978	5,020	4,052	80.7	241,124	\$ 48.03
1979	5,318	4,130	77.7	309,870	\$ 58.27
1980	5,695	4,109	72.2	280,953	\$ 49.33

¹ Shipments as a percent of tonnes produced.

Source: Stelco, Annual Reports.

Financial and Operating Results

Stelco's sales revenues in 1980 were \$2,229 million, up 6.6 percent from 1979 sales of \$2,091 million. The level of shipments in 1980 was 4,529,000 tonnes, down 1.5 percent from the previous year's total. In the first six months of 1981, Stelco's sales revenues increased 34.3 percent over the comparable period in 1980. Net income in the first 6 months of 1981, at \$115 million, is 87.1 percent of the net earnings for the whole of 1980. (See Table 25) The net income for the first six months of 1981 is deceiving as the interest earnings on borrowed and as yet unspent funds is quite high. (Interest income contributed nearly 50 percent to the overall net earnings in the first half of 1981.)

STELCO, INC. FINANCIAL AND OPERATING RESULTS, 1976 to 1981 Q2 (\$ millions, except shipments)

Table 25

	1st six months						
	1981	1980	1980	1979	1978	1977	1976
Shipments (000 tons)	2,731	2,247	4,529	4,553	4,466	3,995	4,028
Sales	1,473	1,097	2,229	2,091	1,776	1,444	1,360
Pre-tax Income	182	92	172	219	151	83	94
Net Income	115	76	132	157	112	82	77
Capital Expense	85	116	192	204	145	145	173

Source: Stelco, Annual Reports, and Financial Post Data Base

Stelco's steel shipments in the first six months of 1981 were 2,731,000 tonnes, up 21.5 percent from the same period in 1980. Much of the increase is due to production from the Lake Erie works. Receipts per ton of steel in the domestic markets was \$484 as against \$454 for export sales. Pre-tax net income in 1980 was \$172 million and is expected to nearly double to \$341 million in 1981. (See Table 26)

**STELCO INC.
SUMMARY OPERATIONS ESTIMATES,
1981-1982**

Table 26

	<u>Actual</u>	<u>Est.</u>	<u>Est.</u>
	<u>1980</u>	<u>1981</u>	<u>1982</u>
Total Shipments ('000 tons)	4,529	5,100	5,200
Domestic Sales/ton (\$)	494	561	640
Export Sales/ton (\$)	454	572	653
Total Sales/ton (\$)	485	564	643
Employment Cost/ton (\$)	157	177	195
Energy Cost/ton (\$)	29	35	41
Raw Material Cost/ton (\$)	237	258	283
Operating Cost/ton (\$)	423	469	519
Operating Profit/ton ¹ (\$)	61	94	124
Pre-tax Net Income (\$ millions)	172	341	489

¹The operating income per ton for 1980 as reported by Gordon Securities because of methodology. Our figures are based on operating income per tonne of raw steel produced whereas Gordon Security calculates it on the basis of operating income per ton (net) of shipments.

Source: Gordon Securities, 1980.

Much of Stelco's forecasting as listed in Table 26, was done in February 1981, under the assumption of a 12.7 percent increase in labour costs for 1981. The final settlement at Stelco may be for a much higher wage increase which eventually will show in the firm's balance sheets and in the future earnings.

ix) Algoma Operations

Algoma Steel is a subsidiary of Canadian Pacific Enterprises Limited which held about 57 percent of Algoma's outstanding common shares at December 31, 1980. The principal production facilities of Algoma are located in Sault Ste. Marie, Ontario. The steel mill has the advantage of being close to raw material sources which can be obtained at relatively low costs. However, Algoma's products must travel longer distances to reach Central Ontario

markets than those of Stelco and Dofasco. Thus its transportation costs for shipment of the final product are higher.

Since it is a subsidiary of Canadian Pacific Enterprises, Algoma is related to the numerous companies in the Canadian Pacific Group. However, it also has significant control of two other companies:

- o AMCO Limited - The corporation owns 42.8 percent of the common shares of this firm, formerly known as Dominion Bridge Company Limited. AMCO is a steel fabricator with business in Canada and the United States;
- o Tilden Mine - The corporation has a 30 percent interest in this joint venture. Tilden is an iron ore mine.

Production Facilities and Plans

Algoma produces the widest structural beams and the widest steel sheets in Canada. Much of Algoma's products are biased towards capital projects. Since Algoma does not produce any coated or plated steels, it is somewhat immune to fluctuations in the appliance, tin can and (to a lesser degree) auto industries.

Algoma's steel-producing capability as of January 1, 1981 was 2.9 million tonnes, representing only 71 percent of the capacity, the lowest capability/capacity ratio of the big three. The works include two continuous casters with a capacity of 1.36 million tonnes and ingot production and rolling capacity of 2.54 million tonnes. Algoma's finishing mills can handle only 2.5 million tonnes of steel, thus posing production limitations.

Future Plans

Algoma's future plans call for continued increases in production and a doubling of the proportion of steel produced by continuous casting to 70 percent by 1990 from a rate of about 35 percent for the first quarter of 1981. This is a long term project which will be accomplished in several stages and will require large sums of capital. The net result of increasing the proportion of continuously casted steel will be an improvement in Algoma's yield rate. This will greatly improve Algoma's performance given that a one percent improvement in yield results in \$4.5 to \$6.2 million in savings per year for the company.

Some specific projects scheduled to be completed in 1981 and onwards are:

- o A scheduled expansion of heat treating facilities to be completed in 1981. A tube heat treating section was completed in January 1981 and has been operational since. The plate heat treating portion also went into production towards the end of May 1981;
- o Another seamless tube mill to be completed in the 2nd quarter of 1984 with an annual rated capacity of 272,000 tonnes per year. The plant will produce 2" to 7" pipes. This new plant will overlap some of the sizes of the old plant. However, the new plant will concentrate on small diameter pipes while the first plant will concentrate on larger sizes, thereby increasing output;
- o Rail and structural mill capacity expansions of 40,000 tonnes which were 50 percent complete as of the fourth week in April, 1981.

Algoma's total capital expenditures commitments as of April 1981 in 1981 dollars are shown in Table 27. It is worthwhile to note that the \$75.1 million

**ALGOMA STEEL COMMITTED MAJOR EXPENDITURES,
1981 and onwards
(\$ millions)**

Table 27

	Total Cost	Cost to Date	Cost 1981	Beyond
Cokemaking Department	144.8	5.1	33.7	106.0
Ironmaking Department	101.7	22.9	75.1	3.7
Steelmaking Department	35.2	3.1	12.4	19.7
Rolling Mill Department	118.0	56.6	52.9	8.5
Utilities & Services	29.2	2.0	25.2	2.0
Tube Division	279.7	2.0	77.7	200.0
	708.6	91.7	277.0	339.0

Source: Algoma Steel, 1980.

expenditures in iron-making for 1981 include \$70 million to reline one furnace (No. 7 blast furnace), and that the project will employ 1,000 men at its peak. The furnace initially started production in May, 1975 at a total cost of \$52 million. It is expected to be back in production by November 1981. This demonstrates that capital costs in the steel industry are very high.

Financial and Operating Results

Algoma steel produced 2,884,000 tonnes of raw steel in 1980 as against shipments of 2,191,000 for an apparent yield of 76 percent. (See Table 28) Raw steel production increased 35 percent between 1971 and 1980, while shipments increased 42 percent due to a yield improvement of about 4 percent over this period. Algoma's operating income per tonne, at \$67.17, was over four times that in 1971, representing the highest increase among the big three. This enabled Algoma to rank second in terms of operating income per tonne.

ALGOMA STEEL PRODUCTION AND YIELD, 1971-1980

Table 28

Year	Raw Steel			Operating Income (\$000's)	Operating Income/Tonne
	Production (000's Tonnes)	Shipments (000's Tonnes)	Yield ¹		
1971	2,140	1,542	72.1	35,609	\$ 16.64
1972	2,201	1,590	72.2	39,112	\$ 17.77
1973	2,404	1,765	73.4	62,420	\$ 25.97
1974	2,507	1,831	73.0	94,103	\$ 37.54
1975	2,493	1,785	71.6	67,818	\$ 27.20
1976	2,620	1,847	70.5	45,491	\$ 17.36
1977	2,698	1,997	74.0	66,651	\$ 24.70
1978	3,009	2,228	74.0	120,194	\$ 39.94
1979	3,201	2,356	73.6	184,383	\$ 57.60
1980	2,884	2,191	76.0	193,704	\$ 67.17

¹ Shipments as a percent of tonnes produced.

Source: Algoma Steel Corporation Limited, Annual Reports.

Algoma's sales revenues in 1980 were \$1,149 million, an increase of 6.3 percent over 1979 revenues (See Table 29). However, steel shipments in 1980 were 2,415,000 net tons, down 7 percent from the 1979 levels. Algoma's net income in 1980 was \$109 million, down \$3 million from its record earnings in 1979. In the first six months of 1981, however, Algoma's pre-tax income, at \$118 million, was only \$9.3 million short of pre-tax earnings for all of 1980. Net income in the first six months of 1981 was \$87 million, up 67 percent from the same period in 1980. Finally, capital expenditures in the first six months of 1981, at \$80 million, were 54 percent above those in the same period of 1980.

**ALGOMA STEEL FINANCIAL AND OPERATING RESULTS,
1976 to 1981 Q2
(\$ millions, except shipments)**

Table 29

	First 6 Months						
	1981	1980	1980	1979	1978	1977	1976
Shipments (000 net tons)	1,319	1,289	2,415	2,597	2,456	2,201	2,036
Sales	712	587	1,149	1,081	864	688	585
Pre-tax Income	118	59	121	120	58	6	(14)
Net Income	87	52	109	112	77	37	23
Capital Exp.	80	52	107	89	39	30	51

Source: Algoma, Annual Reports.

The number 7 blast furnace of Algoma was shut down in July of 1981 for a period of about four months. It is the largest blast furnace at Algoma, and its shut down will reduce the quantity of steel available for finishing and sale. Algoma's net earnings thus are likely to decline in the second half of the year compounded with the first six months earnings of 1981. Table 30 provides estimates of Algoma's performance for the next two years.

ALGOMA STEEL
SUMMARY OPERATIONS ESTIMATES,
1981-1982

Table 30

	<u>Actual</u>	<u>Est.</u>	<u>Est.</u>
	<u>1980</u>	<u>1981</u>	<u>1982</u>
Total Shipments (000's net tons)	2,415	2,600	2,800
Domestic Sales/ton (\$)	470	537	603
Export Sales/ton (\$)	489	564	628
Total Sales/ton (\$)	475	542	608
Employment cost/ton (\$)	162	185	203
Energy cost/ton (\$)	30	36	43
Raw Material cost/ton (\$)	203	229	250
Operating cost/ton (\$)	395	450	496
Operating profit/ton ¹ (\$)	80	92	112
Pre-tax Net Income (\$ millions)	121	161	227

¹The operating income per ton for 1980 as reported by Gordon Securities because of methodology. Our figures are based on operating income per tonne of raw steel produced whereas Gordon Security calculates it on the basis of operating income per ton (net) of shipments.

Source: Gordon Securities, 1980.

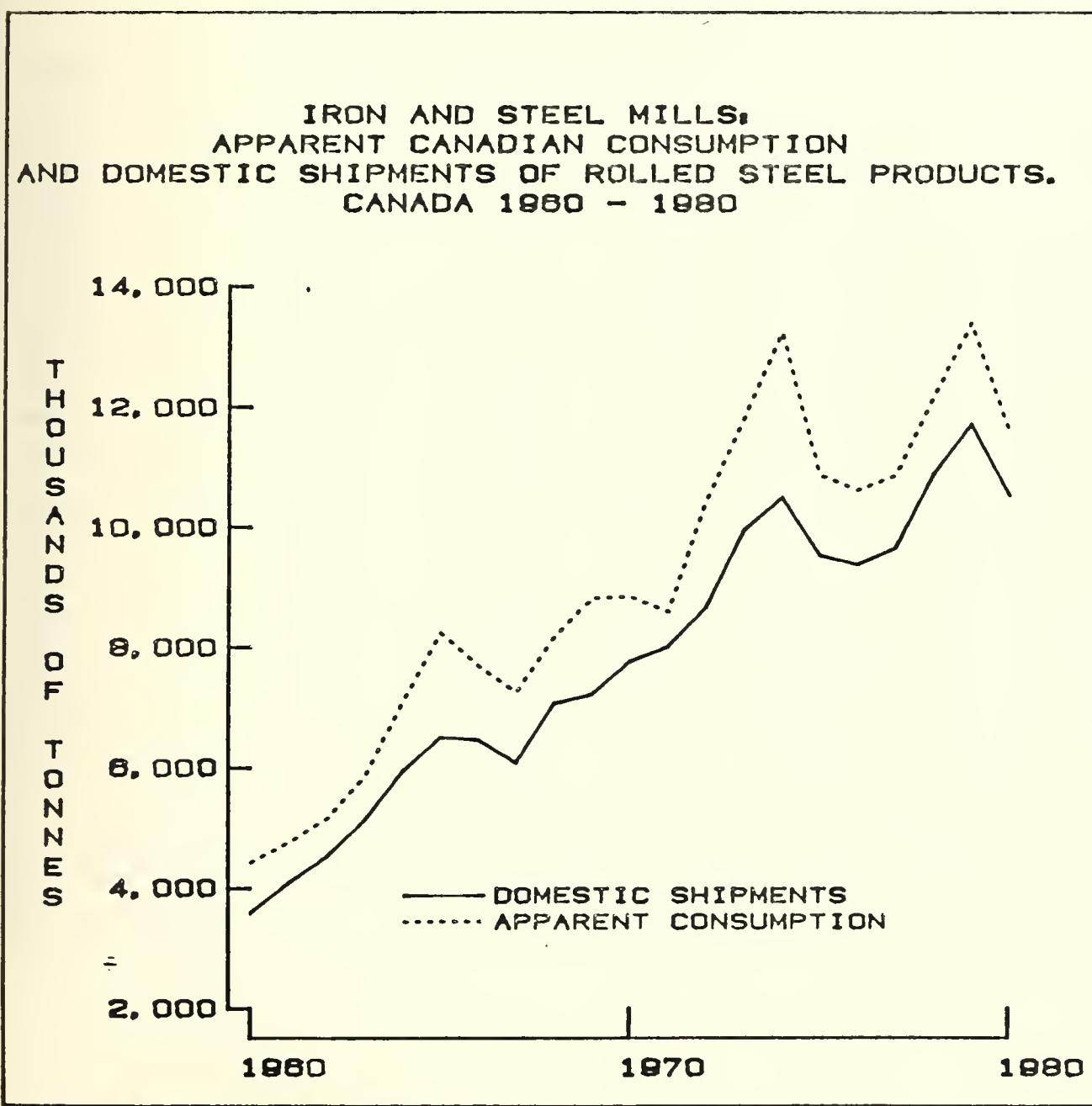
Algoma's earnings per ton of steel shipped are expected to increase in both 1981 and 1982. Algoma's labour cost per unit of steel is not expected to rise as high as that at Stelco or Dofasco. In terms of net earnings per ton, Algoma will remain in second place, relative to the other big steel-makers.

IV STEEL DEMAND PRODUCTS AND MARKETS

A. General

Users of steel are too numerous to be individually listed. Steel is used in all sectors of the economy and it is unlikely to be totally replaced by any other product, at least in the foreseeable future. The demand for steel is a derived demand, and it fluctuates according to the demand for end products and major projects. Apparent domestic consumption of steel declined in 1980 to 11,600,000 tonnes, down 13.3 percent from the 1979 level of 13,388,000 tonnes, as shown in Figure 11.

Fig. 11



SOURCE: STATISTICS CANADA

An interesting observation from this graph that domestic steel shipments have been consistently below the apparent domestic consumption on an annual basis. In 1960, domestic steel mills supplied only 81 percent of apparent domestic consumption. By 1970, however, the proportion of steel provided by domestic mills had increased to almost 88 percent, and this proportion improved slightly to 91 percent at the end of 1980. A noteworthy observation from Table 31 that exports totalled over 3 million tonnes in 1980, displaying a dramatic increase of 70 percent over the 1979 level.

CANADA: IRON AND STEEL CONSUMPTION, 1960-1980
(000 tonnes except for 'Per Capita')

Table 31

<u>Year</u>	<u>Domestic Shipments</u>	<u>Imports</u>	<u>Exports</u>	<u>Apparent Consumption</u> ¹	<u>Per Capita Consumption</u> ²
1960	3,583	836	725	4,418	250
1961	4,078	670	526	4,748	260
1962	4,514	625	609	5,139	280
1963	5,118	719	799	5,837	310
1964	5,927	1,137	784	7,064	360
1965	6,492	1,736	610	8,228	420
1966	6,456	1,221	673	7,676	380
1967	6,075	1,165	751	7,241	360
1968	7,058	1,094	1,103	8,152	390
1969	7,208	1,600	707	8,808	420
1970	7,757	1,076	1,310	8,833	410
1971	8,003	1,574	1,210	8,577	440
1972	8,655	1,761	1,174	10,416	480
1973	9,945	1,861	990	11,806	540
1974	10,488	2,739	1,011	13,227	590
1975	9,521	1,340	861	10,861	480
1976	9,372	1,136	1,426	10,609	460
1977	9,647	1,207	1,729	10,855	670
1978	10,873	1,288	2,016	12,161	520
1979	11,707	1,681	1,774	13,388	570
1980	10,534	1,066	3,018	11,600	490

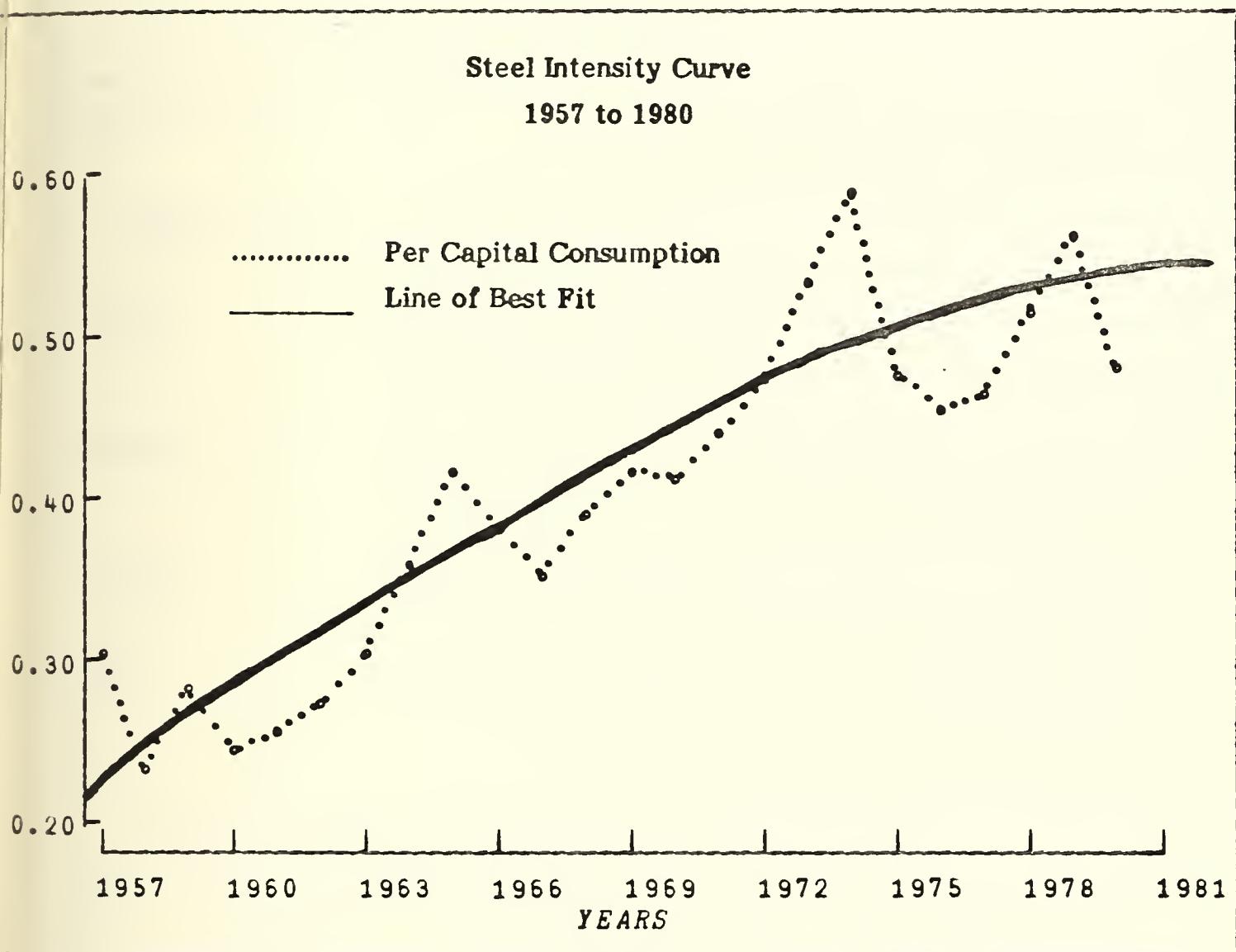
¹Apparent Consumption = Domestic Shipments plus Imports less Exports.

²Per Capita Consumption in Kilograms.

Source: Stelco.

Per capita consumption (also called intensity) of rolled steel products in 1980 was 490 kg. compared with 570 kg. for 1979. The highest per capita consumption of steel was in 1974, at 590 kg. which dropped drastically to 480 kg. the following year. Per capita steel consumption is often called steel intensity. Figure 12 shows that the rate of growth of steel intensity in Canada has flattened out somewhat in recent years, especially in comparison to the relative high growth of the 1960s.

Fig. 12



Source: Table 31

In the United States, per capita steel consumption between 1950 and 1977 grew very little, from 0.420 tonnes to 0.450 tonnes respectively,¹ whereas in Canada per capital steel consumption almost doubled between 1960 and 1980. The difference is largely due to the major capital expenditures which are required to improve infrastructure in Canada. Most of these projects use large quantities of steel.

¹OTA Report, p. 172.

Domestic consumption of steel moves very closely with movements in economic activity as measured by gross national product (GNP). Steel demand in Canada has consistently shown the same secular growth rate as real GNP. From 1950 to 1979 the growth of both real GNP and steel consumption was 5.0 percent.¹ Steel consumption per \$1,000 of real GNP in the United States declined from 120 kg. in 1950 to about 74 kg. in 1979.¹ In Canada, however, steel consumed per \$1,000 of real GNP increased marginally between 1961 and 1980 from 87 kg. to 89 kg.

Steel faces tough competition from other materials and metals such as cement, plastics, wood, aluminum and glass. Some steel substitutes and their applications are:

<u>Substitute</u>	<u>Applications</u>
Cement	Construction of buildings, bridges, pipes, light posts, water storage tanks.
Aluminum, Zinc	Auto parts, railway cars, containers, appliances and furniture.
Plastics	Appliances, automobiles, furniture and fixtures.
Glass	Bottles and containers.

Because of general acceptability and usefulness of these substitute materials, the growth rate of steel consumption has been relatively lower than that for the substitutes. The absolute growth rate of steel consumption in the United States between 1955 and 1977 was one third that of aluminum and one fourth that of plastics. The trends are believed to be similar in Canada. Even now other substitutes appear to be winning over steel. For example, urban trains developed by the Urban Transit Development Corporation use aluminum car bodies rather than steel. However, the rails and the wheels of the trains will continue to require steel.

¹OTA Report, p. 172.

The steel industry has taken steps to face the competition from substitute materials. High-strength, low-alloy steels (HSLA) are recovering part of the market lost to plastics and aluminum. Moreover, the industry uses some of the substitutes (zinc, aluminum, tin) to produce a steel product which incorporates some of the properties of the substitutes. the Galvanized steel uses zinc coating to provide resistance to rust, while galvalume incorporates aluminum as a further improvement on galvanized steel. With such new products, and improvements on the existing products, the steel-makers expect to improve their share of the market, or at least to maintain their share of auto markets.

B. Steel Use by Sector

Major steel-using sectors in 1980 according to the quantity of steel shipped to the sector were: steel service centres (steel warehouses and wholesalers) with 18.6 percent of domestic shipments; pipe and tube mills (17.3 percent); motor vehicles and parts manufacturers (12.0 percent); steel fabricators (10.8 percent); and wire and wire products manufacturers (8.1 percent). (See Table 32)

Other sectors such as stampers, and manufacturers of containers and closures, railways, machinery and equipment account for much smaller portions of steel usage. It is interesting to note that there has been very little changes in respective rankings among sectors and or percent changes from 1970 levels. In the interim years wide fluctuations in demand from individual sectors are possible but overall the proportions of total shipments to each sector remain relatively unchanged. Much of the interim fluctuations are caused by business cycles within individual sectors.

**CANADA: RANKING OF SECTORS RECEIVING
ANNUAL SHPMNTS OF ROLLING MILL PRODUCTS**

Table 32

Sectors	Capital or Durable	Percentage of Total Domestic Shipments of Rolled Steel Products Received	
		1970	1980
1. Steel Service Centres	C	15.9	18.6
2. Pipes and Tubes	C	14.5	17.3
3. Motor Vehicles and Parts	D	11.0	12.0
4. Steel Fabrication	C	13.1	10.8
5. Wire and Wire Products	D	7.2	8.1
6. Contractor's Products	C	6.7	5.4
7. Stamping, Pressing, Coating	C	5.6	5.1
8. Containers and Closure	D	6.6	4.7
9. Railway Operating	C	5.2	3.2
10. Natural Resource and Extractive Industries	C	2.7	2.8
11. Railroad Cars and Locomotives	C	1.6	2.0
12. Non-electrical Machinery	C	3.9*	1.9
13. Agricultural Equipment	C	1.8	1.7
14. Industrial Packaging Equipment	C	n.a.	1.6
15. Appliances and Utensils	C	2.0	1.5
16. Electrical Machinery	D	---	1.2
17. Metal Building Systems	C	n.a.	.7
18. Miscellaneous	D	2.2	1.4
TOTAL		<u>100.0</u>	<u>100.0</u>

*Note: Figure for 1970 includes electrical and non-electrical machinery.

Source: Statistics Canada, Primary Iron and Steel, Cat. No. 41-001..

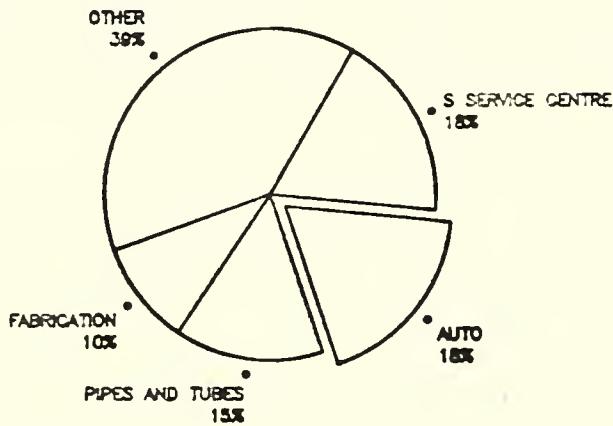
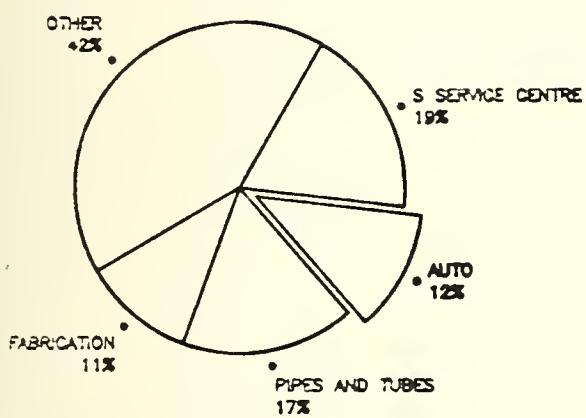
An attempt is made in Table 32 to identify steel shipments to the capital goods and construction industry (identified by C) and to the durable or other consumer goods industry (identified by D). The largest entries in consumer durables are the motor vehicles and parts sector (12.0 percent), wire products (8.1 percent) and containers (4.7 percent). Overall, consumer goods accounted for approximately 28 percent of the 1980 total. However, many experts believe that the usual ratio of capital to consumer related shipments is two to one.

Any fluctuations in capital expenditures (including construction) can thus create wide fluctuations in final steel demand.

The respective shares of total domestic shipments of rolled steel for the major steel-using sectors are graphically presented in Figure 13. The declining importance of the auto sector is particularly emphasized.

Fig. 13

STEEL SHIPMENTS BY SECTOR 1980 / 1978



1980

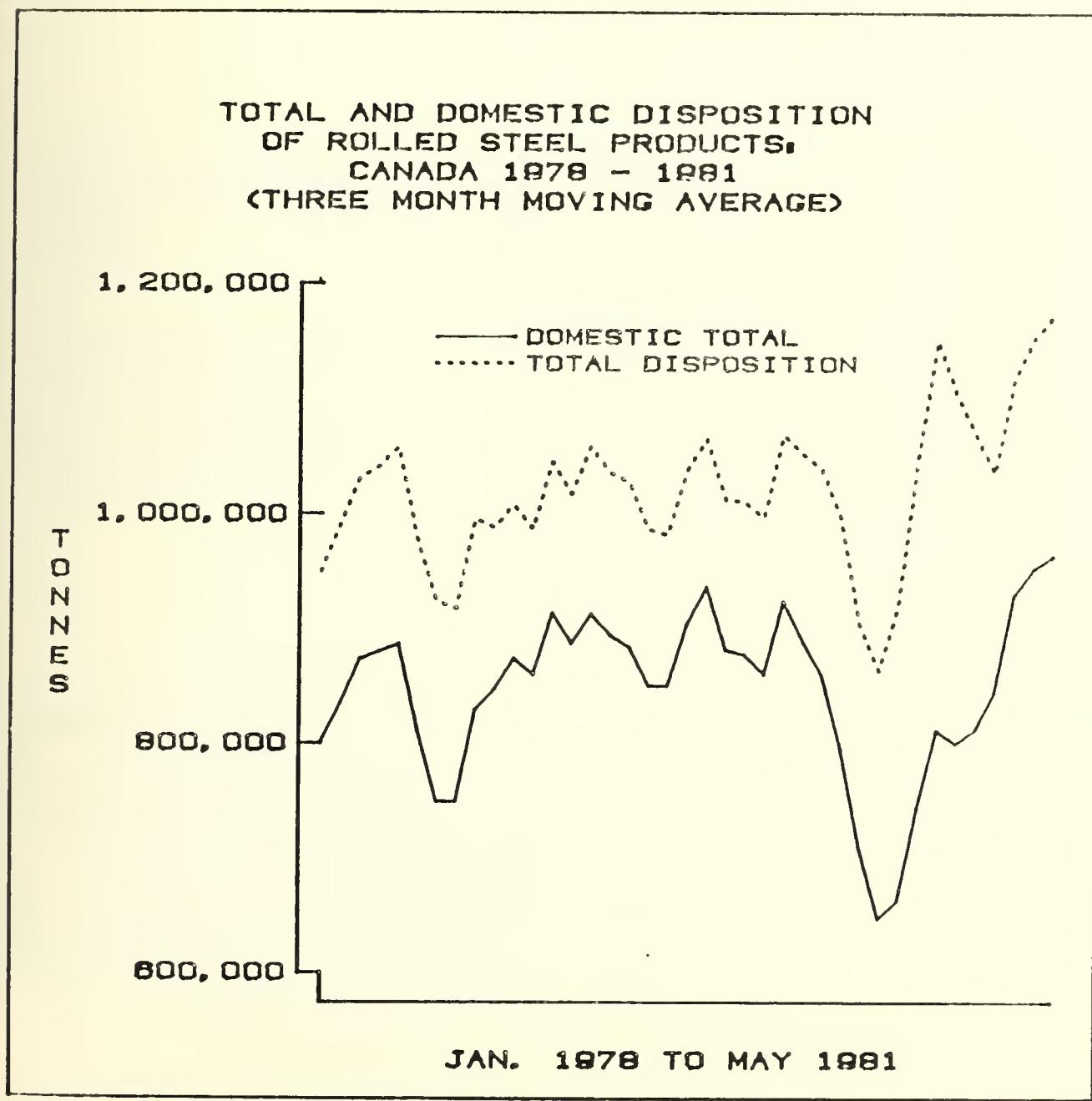
1978

Source: Statistics Canada.

When demand for a final product such as automobiles declines, it creates a chain reaction through the whole system which finally ends at the steel-maker. The big drop in domestic steel demand (over 1 million tonnes) in 1980 "... is believed to be due to an inventory reduction taking place in the whole steel distribution network. (Similarly), all of the 18 percent drop in apparent steel consumption from 1974 to 1975 was due to inventory reductions."¹

Figure 14 shows the level of fluctuation in steel shipments even after attempts were made to reduce monthly fluctuations by taking a three month moving average. The steep dip occurred in July 1980, and was followed by equally spectacular improvement in the fourth quarter of 1980.

Fig. 14



SOURCE: STATISTICS CANADA

¹ Peter T. Hyland, Gordon Securities Ltd. The Canadian Steel Industry. November 1980, pp. 31, 33.

Steel is produced to meet the hundreds of specifications of consumer needs. Algoma Steel, for example, produces steel to meet over 700 specifications. An examination of steel shipments by twelve major types demanded by selected individual sectors is shown in Table 33. It provides important information about the impact on individual companies of changes in demand for the end products of a particular sector. As mentioned earlier, the major steel companies tend to specialize in certain types of steel.

MENTS OF ROLLED MILL PRODUCTS TO MAJOR SECTORS, 1980
(Percent of Total Tonnes Demanded by Each Sector)

Table 33

Products	Sectors				
	Steel Service Centres ²	Pipes & Tubes ³	Motor Vehicles & Parts ⁴	Steel Fabrication ⁵	Wire & Wire Products ⁶
Hot-Rolled Sheet & Strip	16.3	40.8	48.8	6.8	0.3
Cold-Rolled & Coated Sheet & Strip	11.3	7.2	14.2	0.2	1.2
Plate (including plate for Pipe & Tube)	20.2	31.3	6.1	18.2	neg.
Hot-Rolled Bars	9.4	0.3	20.6	3.1	9.0
Galvanized Sheet	9.5	1.3	4.7	3.8	0.1
Wire Rods	neg.	neg.	1.5	neg.	83.6
Rails & Heavy Structural Shapes	7.3	0.4	neg.	22.6	neg..
Concrete Re-enforcing Bars	8.0	neg.	neg.	33.0	4.6
Ingots & Semi-finished Shapes	neg.	18.5	2.4	neg.	neg.
Intermediate Structural Shapes	9.7	neg.	0.3	8.3	neg.
Bar-Sized Structural Shapes	5.7	neg.	0.1	3.9	0.8
Cold-Finished Bars	2.4	neg.	1.4	neg.	neg.
TOTAL ¹	<u>99.8</u>	<u>99.8</u>	<u>100.1</u>	<u>99.9</u>	<u>99.9</u>

= negligible.

Totals may not add to 100.0 due to rounding.

Steel wholesalers & warehouses

Includes pipes, tubes, pipe fittings and conduit manufacturers.

Includes automotive parts, bumpers, shock absorbers, truck bodies, frame manufacturers.

Includes steel purchased for bridges, hydro developments, storage tanks, transmission towers, public utilities and re-enforcing steel fabricators.

Includes chains, fasteners, fence, mesh, nails, rivets, wire, wire rope

Screw machine products.

Source: Statistics Canada, Primary Iron and Steel, Cat. No. 41-001.

Pipe and tube mills bought nearly 41 percent of their steel requirements in the form of hot rolled sheet and strip, 31 percent in the form of plate, and 18.5 percent in the form of ingots. Almost all of the ingots shipments in this category are from Algoma's steel mills to its own pipe and tube plant. Much of the hot rolled sheet and strip goes to Prudential Steel (a subsidiary of Dofasco) which produces small diameter pipe. Plate, including plate for pipe and tube, goes to the large diameter pipe manufacturing plants of Stelco in Ontario and Ipsco in Alberta.

Nearly 50 percent of the automotive sector's needs in 1980 were accounted for by hot rolled sheet and strip, used mostly for frames, wheels and bumpers; 20 percent were accounted for by hot rolled bars, (used mainly for auto parts and for strength in auto bodies) and 14.2 percent by cold-rolled and coated sheet and strip, (used to produce the outer shell of an auto). A more detailed analysis of selected important steel consuming sectors follows.

C. Steel Service Centres

Steel Service Centres (SSCs) initially were called warehouses and they performed the typical functions of a warehouse (i.e. the holding of inventories of steel mill products and the sale of such inventories to small customers after minor processing like cutting, shearing etc.). Now, steel service centres play a much wider role in the steel distribution network. The industry employs about 10,000 persons and serves over 30,000 clients. SSCs maintain about half a million tonnes of steel at any time in inventories, process it by such methods as sawing, shearing, flame cutting, and slitting, and deliver it to customers. The SSCs predict that their business will continue to grow at a faster rate than the steel mill output. Given the high costs to individual steel companies of maintaining their own inventories of steel, it is likely that SSCs will continue to get a greater share of domestic steel shipments.

Table 34 shows the dominance of steel service centres in the demand for various steel products from domestic mills. In real terms, SSCs largest demands are for plates, hot rolled sheet and strip, and cold rolled sheet, which together account for almost half of this sector's steel demands. In terms of proportion of total domestic demand, SSCs particularly dominate the demand for intermediate structural steel (62.0 percent of total), bar sized structural steel (68.0 percent) and cold rolled bars (45.7 percent).

MAJOR STEEL FORMS BOUGHT BY SCCS IN 1980

Table 34

	'000 Tonnes	% of Total Domestic Demand
	'000 Tonnes	
Plates	359	23.4
Hot Rolled Sheet & Strip	289	15.3
Cold Rolled Sheet	201	12.8
Structurals		
Intermediate	173	62.0
Heavy & Rails	130	21.1
Bar Sized	102	68.0
Galvanized	170	20.0
Bars		
Hot Rolled	168	19.6
Concentrate Reinforce	142	25.5
Cold Rolled	43	45.7
Others	5	
Total	1,781	18.6

Source: Statistics Canada, Primary Iron and Steel, Cat. 41-001.

The Canadian steel industry recognizes the importance of SSCs to their operations, and all major steel mills are members of the Canadian Steel Service Centres Institute.

The Steel Service Centres are not the final consumers of steel. The steel bought by the SSCs is sold to other final users after minor processing. The final destination of steel from the steel service centres for 1979, the latest year for which information is available, was as follows:

- o Steel Fabricators bought 325,000 tonnes in 1979 or 16.8 percent of total SCC shipments. Steel fabricators buy steel for bridges, transmission towers and other public works related construction.
- o Auto Parts Manufacturers bought 238,000 tonnes in 1979 or 12.2 percent of total SSC shipments. SSCs report that major steel users such as wheel, bumper and frame manufacturers buy steel directly from the mills, while other auto parts manufacturers, using smaller quantities of steel, buy from the SSCs.
- o Machinery Manufacturers (non electrical) bought 178,000 tonnes in 1979 or 9.2 percent of total SCC shipments. About 44 percent of steel tonnage shipped to this industry is shipped by the SSCs.
- o Agriculture Sector bought 174,000 tonnes in 1979 or 9 percent of total SCC shipments.

These four sectors consumed about 47 percent of all SSC steel shipments in 1979. An additional 34 percent of SSC steel goes to smaller users such as stampers, processors and coaters (8.2 percent); contractors (7.9 percent); other service centres (7.9 percent); resource industries (6.2 percent) and appliance and utensils manufacturers (4.2 percent), with the remaining 19 percent divided between numerous other sectors.

Outlook for Steel Service Centres

Steel shipments from SSCs are eventually bought by other end use sectors of the economy, creating a situation somewhat similar to that faced by the steel mills. However, steel service centres are likely to outperform the steel mills in terms of growth rate of shipments. The Canadian Steel Service Centre Institute "...confidently predict(s) that service centres will sell about 3 million tons of steel by 1985. By that time, they will employ some 15,000 employees...".¹ This represents a growth rate of 14.9 percent compounded annually. Pipes and tubes may be the only other sector able to match this performance over this period.

D. Auto Sector

Steel shipments to the auto sector in 1980 declined to 1,145,932 tonnes from its 1979 level of 1,685,991 tonnes. This decline of 32 percent, or 540,059 tonnes, represents 5.7 percent of total domestic shipments or 4.4 percent of total steel mill dispositions. The decline in auto sector shipments came as a result of a sudden change in consumer preferences for smaller automobiles and the failure of the North American auto-makers to quickly respond to this change of taste.

Steel is the single most important material used in the manufacture of a motor vehicle and is expected to remain so in the foreseeable future. A typical automobile built in North America in 1980 contained 1,940 lbs. of steel and 484 lbs. of iron for a total of 2,424 lbs. of iron and steel. Steel represents 58 percent, and iron 14 percent of the curb weight of such an automobile. A total of 72 percent of the weight of a typical car built last year was derived from iron and steel. In the continued battle to improve the fuel economy of the fleet of vehicles produced in North America, most auto-makers have been reducing the weight of vehicles by reducing iron and steel input. A typical vehicle produced in 1976, for example, contained 2,785 lbs. of iron and steel, representing 74 percent of the weight of the car. (See Table 35).

¹Firstbrook, General Manager's Presentation, p. 9 session 1.

**ESTIMATED MATERIAL CONSUMPTION IN A TYPICAL
NORTH AMERICAN BUILT CAR, 1976, 1979, 1980 (est.)**

Table 35

Material	1976		1979		1980(est)	
	lbs.	%	lbs.	%	lbs.	%
Low Carbon Steel	2,075	55	1,813	53	1,737	52
High Strength Steel	120	3	155	4	175	5
Stainless Steel	28	1	27	1	28	1
Total Steel	1,223	59	1,995	58	1,940	58
Iron	562	15	492	14	484	14
Total Iron and Steel	2,785	74	2,487	72	2,424	72
Aluminum	86	2	129	4	130	4
Other Metals ¹	129	3	81	2	71	2
Plastics	162	4	192	6	195	6
All Others ²	627	17	563	16	543	16
Total	3,760	100	3,452	100	3,363	100

¹ Other Metal includes copper 28 lbs., zinc die castings 20 lbs., lead 23 lbs. for 1980.

² All others includes glass 83.5 lbs., rubber 131 lbs, fluids and lubricants 178 lbs., and other alloys, cloth, cardboard, and speciality steel at 151 lbs. for a 1980 model.

Source: Wards Automotive Annual 1980.

In addition to this secular decline in the amount of steel per automobile, the Canadian steel industry's share of shipments to the overall North American auto sector declined in 1980 to 7.6 percent from 8.9 percent in 1979. (See Table 36)

**CANADIAN STEEL MILLS' SHARE OF
NORTH AMERICAN AUTOMOTIVE ACTIVITY, 1979 - 1980**

Table 36

Steel Supply Source	Steel Shipments Million Tonnes	
	1979	1980
Canadian Mills	1.9	1.1
U.S. Mills	16.9	11.0
Offshore Imports	2.7	2.4
Total Steel Supply	21.5	14.4
Canadian Mills' Share of the Total	8.9%	7.6%

Sources: - American Iron & Steel Institute, Annual Statistical Report 1979

- Statistics Canada Primary Iron and Steel, Cat. No. 41-001

- Industry estimates prepared by Algoma, Dofasco and Stelco.

The Future of Steel Usage in the Automotive Sector

There is little doubt that the consumer at present wants a fuel-efficient vehicle for personal transportation. This is clearly evident in the fact that domestic cars, particularly the larger models, are not selling well, while smaller Japanese imports are selling at record levels.

In order to predict the future, we must study the past. The behaviour of both the Canadian and U.S. auto markets must be examined because the Auto Pact ties them together. The oil embargo in 1973-74 created a shortage of gasoline in the United States, dramatically increasing the demand for small cars. During this period, the sales of large cars fell to 50 percent from a high of 63 percent in 1970. The trend continued in 1975, with the sales of large cars in the U.S.A. falling to only 46 percent. In 1976, the strong economy and abundant gasoline created a strong demand for large cars and imported car sales fell. The U.S. market has exhibited more significant swings in buying patterns than has been the case in Canada.

During the past few years, many major U.S. cities have had gasoline shortages with the threat of rationing. This, along with the recession, has created market conditions similar to those during the 1974-75 period. The demand shift from small cars to large cars that took place in 1976 is not very likely to happen again. Auto-makers are under pressure not only to improve the fuel economy of their products, but also to improve their general quality, and in particular the levels of safety and emissions.

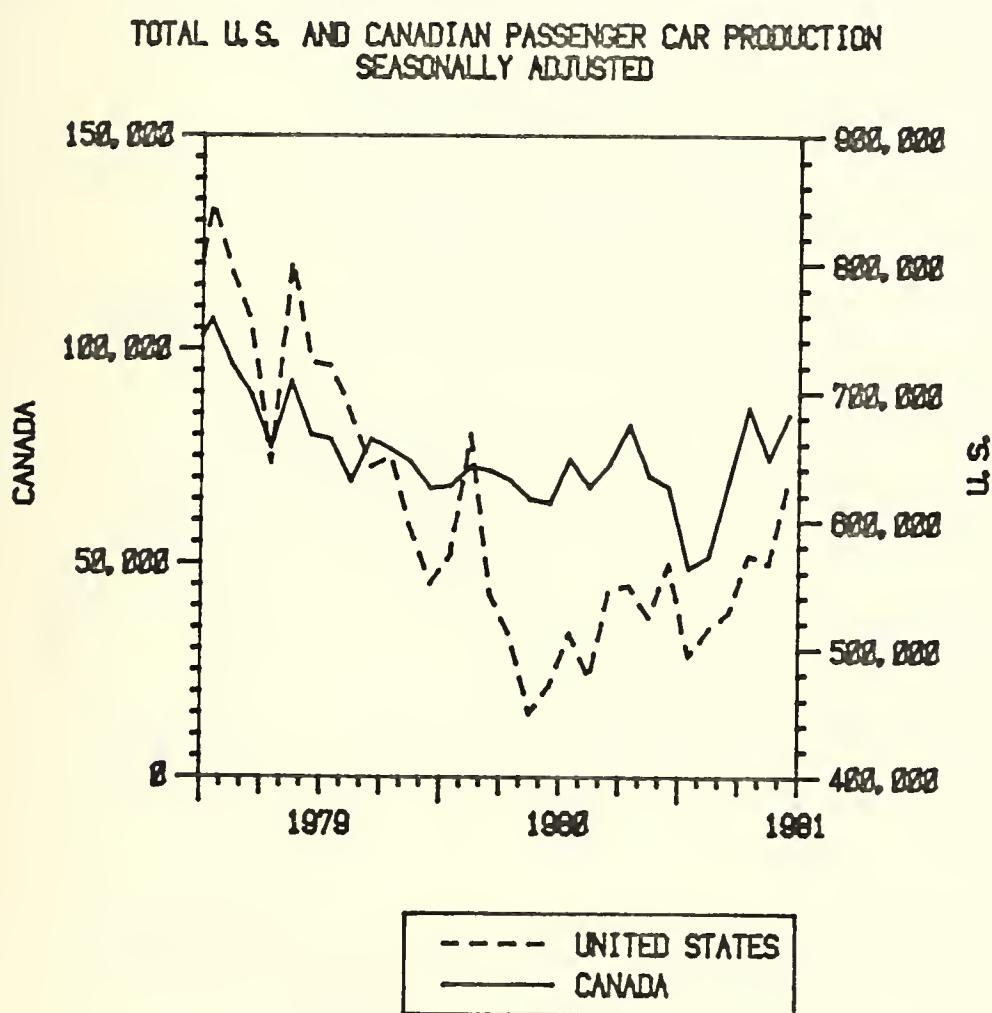
The auto industry is now committed to improve fuel economy by reducing the weight of automobiles, by changing to front wheel drive, and by downsizing. Efforts are being made to change the material input into a vehicle to achieve these objectives. Greater reliance on high strength steels, plastics and lighter metals such as aluminum are also contributing to reduced weight.

The demand for iron and steel from the automotive sector is specifically influenced by:

1. The number of cars and other vehicles in production, and their sales;
2. The proportion of iron and steel input into vehicles by category;
3. After market steel requirements for parts and accessories;
4. Imports of offshore steel.

The numbers of passenger cars produced in both Canada and the U.S. started declining in the third quarter of 1978 , and continued to do so well into the second quarter of 1980. (See Fig. 15)

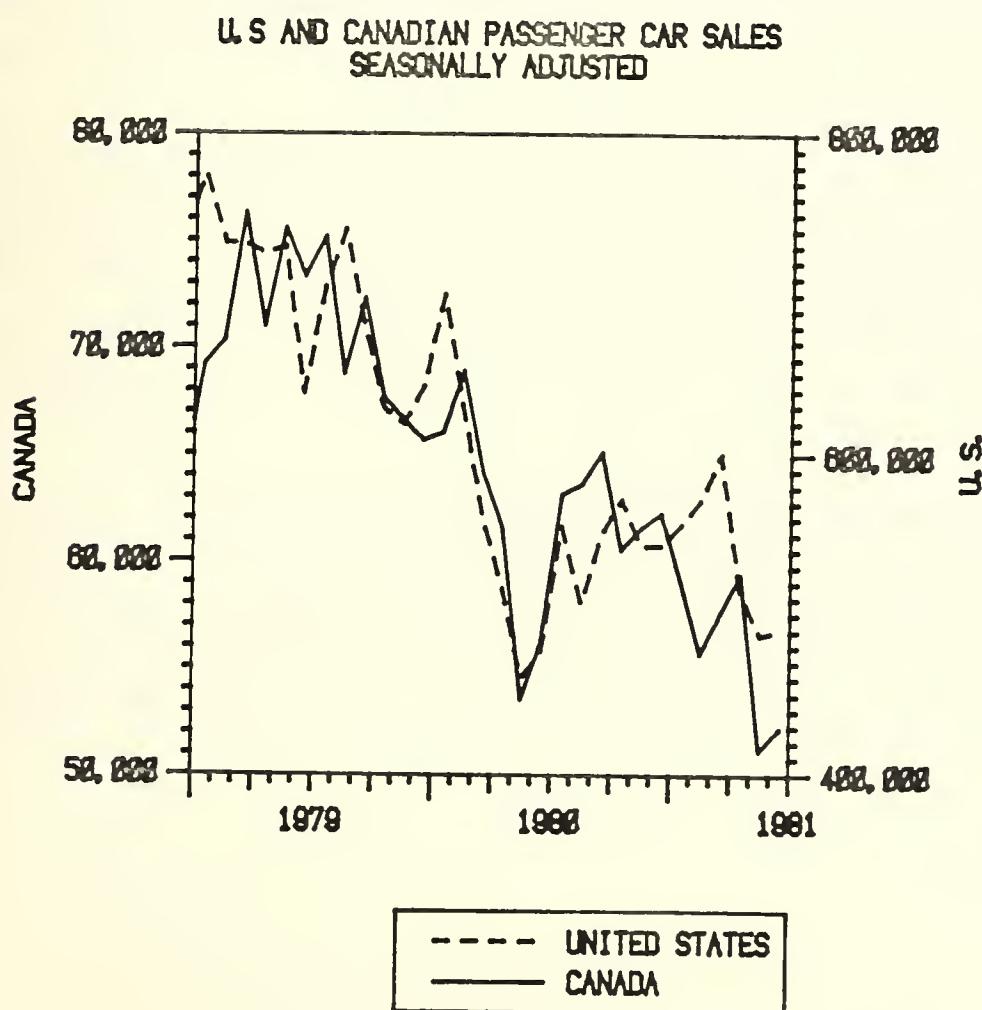
Fig. 15



Since mid-1980 car production has increased marginally, but it has yet to reach 1978 levels. U.S. car production increased by 15.2 percent in the second quarter of 1981 over the first quarter of 1981, and by 23.8 percent over the second quarter of 1980. Canadian passenger car production saw a dramatic 44.8 percent increase between the first and second quarters of 1981, largely due to the start-up of Ford's LYNX/LN7 line in St. Thomas. Since the second quarter of 1980 passenger car production in Canada has increased by 23.8 percent.

While the production of passenger cars has been recovering, the sale of domestic passenger cars, shown in Figure 16, is still on a sharp decline. Between the first and second quarters of 1981, sales have dropped by 13.7 percent in the United States and 5.6 percent in Canada. Sales of Ford-built cars to the end of August 1981 were 100,824, down nearly 6 percent from 106,914 in the same period in 1980. Similarly, truck sales slipped 10 percent to 63,738 from 70,773 in the first eight months of 1980.

Fig. 16



This substantial decline in passenger car sales can be attributed to high interest rates, the ending of U.S. rebate programs, high costs in buying and operating cars, and a shift in demand toward small cars, which has not been fulfilled by North American auto manufacturers.

The sale of both trucks and passenger cars is not expected to increase to the 1979 level for a few years to come. The prospect of income tax cuts and lower inflation rates in the U.S. should provide some sales support. Dofasco forecasts that overall vehicle production in Canada may increase by about 2 percent during 1981 over 1980, with no change in 1982, and a 0.5 percent increase in 1983. After 1983, an increase in auto production is forecasted at about 2.3 percent per annum until 1988. Actual production increases are a function of car sales which will be determined by North American economic prospects, and the ability of North American auto manufacturers to meet the market demand for affordable small cars. So far the sales of domestically produced cars is not showing any prospect of recovery. If the demand for such cars does not improve soon, production levels likely will be trimmed, thereby reducing demand for steel.

Also an important factor in the determination of future steel demand by the auto sector is the material input of a typical vehicle in the 1980's. General Motors, the largest auto manufacturer in North America, has estimated the use of various materials in an automobile to the year 1987. Some of the highlights of their projections are:

- o According to Wards Automotive Report for 1980, a typical 1985 model car is expected to have only 1,300 lbs. of low carbon steel, down 25 percent from 1,737 lbs. in a 1980 car. The use of high strength steel, however, is expected to increase over this period to 300 lbs. from 175 lbs. in 1980 (See Table 37).

FORECAST MATERIAL CONSUMPTION IN PASSENGER CARS
AS PERCENTAGE OF TOTAL WEIGHT, 1978 - 1985
(net materials consumption as percentage of net weight)

Table 37

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Steel	60.2	60.0	60.2	61.3	60.4	60.5
Cast iron	16.2	16.0	15.1	12.9	12.2	10.7
Aluminum	3.6	3.9	4.2	4.8	5.5	6.1
Plastics	5.7	5.9	6.6	6.7	7.6	8.3
Glass	2.7	2.7	2.6	2.7	2.8	2.8
Other	11.5	11.6	11.2	11.6	11.5	11.7
Total¹	100.0	100.0	100.0	100.0	100.0	100.0
Steel weight (lb/unit)						
Gross ²	2,763	2,734	2,715	2,666	2,526	2,385
Net	2,004	1,986	1,958	1,936	1,825	1,736

¹Totals may not add to 100.0 percent due to rounding.

²Gross weight = amount of steel purchased. Net weight = amount of steel in automobile.

Source: General Motors Corp., administrative services engineering staff, Apr. 2, 1979.

- o The weight of steel as a proportion of the total weight of a typical passenger car in 1980 was 60.2 percent. By 1985 it will increase marginally to 60.5% percent. The proportion of high strength low alloy steel (HSLA) is expected to rise sharply from 175 lbs. in 1980 to 300 lbs. in 1985. Table H12 in Appendix H provides data on iron and steel by type required in a typical car for years 1981 to 1985.
- o The proportional weight of cast iron will decline rather steeply from 16.2 percent in 1980 to 10.4 percent in 1985.
- o Both aluminum and plastics are expected to continue to take a greater share of the weight of an automobile.

There is a definite trend towards a decline in the steel and iron used per automobile. By the mid-1980's the weight of an average automobile is expected to be at its lowest limits and it likely will not be reduced further. Moreover, the role of plastics and other synthetic materials is likely to stabilize at the levels reached in mid-1980's. The auto industry made expensive mistakes in introducing plastics in critical areas where their performance has been poor. For example Volare models were equipped with plastic brake parts which seized and performed unpredictably. These are currently being replaced. The steel industry has come up with many new types of steel which not only reduce weight, but also meet all the specifications required by the auto industry.

The total tonnage of steel inputs to the auto industry was calculated by using various assumptions utilized by the Office of Technology Assessment. The growth rate predicted for steel shipments to the auto industry is between 0.1 percent and 1.1 percent for the period 1981 to 1985. Similarly, the annual growth rate of steel demand by the auto industry by the year 2000 is expected to be between 0.5 and 1.0 percent.¹ Because of the auto pact, similar trends are likely in Canada as well. Thus, steel shipments to the auto sector from Canadian steel mills should increase annually by between 115 tonnes and 1,150 tonnes per year to 1985. At this rate of will increase, steel shipments to the auto sector will increase to 1,146.6 million tonnes, almost unchanged from 1980 levels, and much below 1979 levels.

There may also be shifts in the types of products going to the auto sector. Dofasco estimates (as of July, 1981) that shipments of flat-rolled products to the automotive industry in 1981 may rise by 20 percent over increase o the depressed levels of 1980. In 1980, the main flat-rolled products going to the auto sector were hot-rolled sheet and strip (559,000 tonnes) and cold-rolled sheet and strip (163,000 tonnes). Together, these products accounted for 63 percent of the total steel shipments to the auto sector. An increase in the shipments of flat-rolled products, without any corresponding reductions in other products, would increase the demand for steel by the auto sector by 13 percent in 1981. However, the demand for such products as hot-rolled bars and structural shapes will decline with the trend toward unitized auto bodies (without frame), plastic bumpers and lighter wheels. Thus, overall steel shipments to this sector will increase, but only marginally.

¹OTA Report, p. 177.

E. Energy Related Projects

The pipe and tube sector purchased 1,655,000 tonnes of steel shipments in 1980, or 17.3 percent of total domestic shipments, second only to the steel service centres. The growth of this sector is tied closely to the energy sector which uses large quantities of steel. The rate of growth in shipments to the pipe and tube sector, at 15.3 percent in 1980 over 1978, was unmatched by any other sector except exports which grew by 49.7 percent. Much of this growth in the pipe and tube sector materialized in the 1978 - 1979 period (12 percent), after which a brief lull in growth occurred due to the federal/Alberta impasse on energy pricing matters. Dofasco reports that the demand for large diameter pipe in the nine months from September, 1980 to July 1981 was its highest in over 10 years. An increase in the construction of energy-related projects in the United States has created high demand for steel in pipes, tubes and oil and country goods such as oil and gas well casings. This has resulted in very strong improvements in steel shipments to this sector in the fourth quarter of 1980 and the first two quarters of 1981.

On September 1, 1981, Alberta and Ottawa finally resolved their energy pricing differences. As a result, Canadian energy sector activity is likely to grow substantially in the next few years, thus creating additional demand for steel. The steel requirements of the energy sector in the 1980's were recently summed up by the President of Stelco, a leader in the manufacture of wide diameter pipe:

"There is no question in my mind that the largest single factor in the future prosperity of the Canadian steel industry, Ontario manufacturing and indeed of the entire Canadian economy will evolve around the aggressive development of our bountiful national energy resources. To give you some idea of the importance of energy development to the steel industry, the amount of steel required to construct all oil and gas energy developments currently on the drawing boards or being contemplated comes to a staggering 17.3 million tons. (15.7 million tonnes) To this must be added the immense amount of spin-off activity such development will generate in the secondary manufacturing and service sectors of the economy."¹

¹J. Allan, President & Chief Executive Office, Stelco Inc., Address at the Financial Post Conference, February 26, 1981.

Over 9 million tonnes of the additional 16 million tonne demand for steel will be for pipelines, with another 3.6 million tonnes for drilling and extraction equipment . (See Table 38)

ENERGY RELATED STEEL REQUIREMENTS IN THE 1980's

Table 38

<u>Project Groups</u>	<u>Steel Requirement (Tonnes)</u>
Tar Sands Plants	453,600
In Situ Heavy Oil	453,600
Pipelines	9,072,000
Petrochemical Plants/Refineries	1,360,800
Energy Related Shipbuilding	725,760
Drilling and Extraction	<u>3,628,800</u>
	15,694,560

Note: Data converted to metric tonnes.

Source: Nesbitt Research, Steel Industries Review, December 4, 1980, p. 14,

If all Canadian steel mills were to produce nothing but the steel required for the energy projects mentioned above, it would take 16 months to produce. (Based on 1980 production of 12.29 million tonnes). If, however, this demand is spread equally over the remaining nine years of this decade, Ontario steel mills will have to divert 1.7 million tonnes of steel annually throughout the 1980's to the energy sector. To meet this demand, domestic producers could either reduce their exports from their 1980 level of 2.7 million tonnes to 1 million tonnes, or allow some of this new demand to be fulfilled by imports. It is highly likely that imports will be needed to supplement domestic shipments for the next 2-3 year period while additional domestic capacity is being built.

As mentioned earlier, Algoma is planning to have a new seamless pipe and tube plant built by mid-1983 at a cost of \$300 million, in preparation for such demand from the energy sector. Many U.S. steel manufacturers already had

announced construction plans for seamless pipe and tube. As of April 1, 1981, announced expansion plans included:

- o U.S. Steel 550,000 tonnes
- o Armco Inc. 500,000 tonnes
- o C.F. & I. Steel Corporation 300,000 tonnes

The rate of capital expenditure commitments announced in this area is rapid enough that a glut of seamless pipe and tube and other oil and country goods is possible in the mid-to-late 1980's. Events now have some similarity to those in 1974 when large capital expenditure plans were announced. In 1975, however, steel markets turned sour and most projects were shelved, including Stelco's Lake Erie expansion which was delayed by about three years. It is possible that similar events may be repeated (ie. not continuing with proposed projects) thereby alleviating the prospect of a glut situation.

F. Construction

The construction sector consumed 1.62 million tonnes of steel in 1980, or about 17 percent of total domestic shipments. This sector covers shipments for:

- o Steel Fabrication - 1,035,590 tonnes
- o Metal Building System - 68,455 tonnes
- o Contractors Products - 515,705 tonnes

Total shipments to this sector in 1980 were about 6 percent below the 1979 level of 1.72 million tonnes, which were only slightly below the record shipments level of 1974. The construction sector covers three main areas:

- o residential construction;
- o non-residential construction (i.e. office buildings, factories etc.); and
- o non-residential engineering construction (ie. bridges, highways, docks, hydroelectric projects etc.).

Residential housing starts in 1980 totalled 158,600 units, the lowest level since 1966. A major reason for this decline was the shock of high interest rates. A backup in housing starts from 1980, along with an acceptance of record high interest rates by consumers, was expected to increase the number of housing starts to between 180,000 and 190,000 units in 1981. However, at the end of August 1981, CMHC revised its estimate for total starts in 1981 to 170,000, an increase of 7.2 percent over 1980. According to preliminary estimates, annual housing starts are expected to be in the range of 200,000 units annually for the 1982 - 1985 period. In the latter half of the decade, housing starts are expected to be in the range of 175,000 units per year.

Non-residential construction, however, has been performing somewhat below the 1980 levels, and Dofasco's commercial research group expects a drop of 3 percent. Between 1982 and 1985, the growth rate is expected to improve to 6 percent per annum.

Similarly, non-residential engineering construction activity has been somewhat slow. The Canadian Institute of Steel Construction (CISC), an association representing companies whose prime business is fabrication of structures and steel buildings, estimates that their requirements for steel in 1981 will be 386,000 tonnes, up 9.8 percent from the 351,000 tonnes of steel purchased in 1979.

Canadian Building reported the results of a recent survey in their June 1981 issue. Its principal features are:

- o Overall construction related expenditures in Canada will grow at a rate of 18.1 percent in 1981, considerably higher than the average annual rate of 12.3 percent in the 1970's;
- o Housing expenditures in 1981 are expected to be \$15.4 billion, or 28.3 percent of the total construction program. This represents an 11.9 percent increase over the 1980 figure of \$15.8 billion (No increase in real terms because of a high inflation rate which may be 13.5 percent for the year);
- o Utilities will spend \$9.8 billion on construction in 1981, representing an increase of 23.8 percent over 1980 expenditures of \$7.9 billion;

- o The mining, quarrying and oil well sector will spend \$8.7 billion or 15.9 percent of the total program. This is an increase of 21.3 percent over 1980 levels of \$7.3 billion;
- o Construction for various levels of government in 1981 will be valued at \$7.5 billion, up 9.2 percent from \$6.9 billion in 1980.

On a regional basis in Canada, Alberta will account for \$13.6 billion worth of construction projects, representing 25.1 percent of the Canadian total. Ontario will follow with \$13.4 billion or 24.6 percent. If the shortages in domestic steel supply persist, the Japanese steel industry may enter the Alberta market, traditionally a market for steel from Algoma and, to a lesser extent, from Stelco and Dofasco.

In terms of specific steel product groups, Dofasco estimates an increase of 3.4 percent in 1981 shipments of flat rolled steel. In 1980, flat rolled products shipments to the construction sector were 844,000 tonnes, accounting for 52.1 percent of the total. Thus the demand for flat rolled products from the construction sector could increase by 30,000 tonnes over 1980. The demand for long products, however, is expected to increase at double the rate for an increase of 60,000 tonnes. Thus the Canadian construction sector demand for steel could increase by 90,000 tonnes, to reach 1.71 million tonnes in 1981.

G. Summary

Total domestic demand for flat rolled products in 1981 is expected to increase by between 500,000 and 710,000 tonnes, representing an increase of between 10 and 12 percent from the 1980 level of 5,921,000 tonnes. Estimates prepared by Dofasco, prior to the Stelco labour strike, conclude that about 90 percent of this increase will be met by domestic mills, with the remainder coming from foreign sources. Total demand for steel products, including both flat rolled and long products, may increase by as much as one million tonnes over the 1980 levels. How much of it is served by domestic sources and how much by foreign sources depends on the duration of the labour strike at Stelco. Latest indications are that the strike will be lengthy, thereby increasing the likelihood of greater reliance on imported sources of steel.

V CANADA'S INTERNATIONAL TRADE IN STEEL PRODUCTS

A. Canadian Steel Products - International Trade

The monumental drop in domestic shipments in the second and third quarters of 1980 forced Canadian steel mills to look at foreign markets. These efforts paid off as overall Canadian steel exports soared to an all-time high of 3,018,000 tonnes, up 70 percent from 1979 and up 250 percent from the 1975 level of 861,000 tonnes. (See Table 39) Total net exports of steel in 1980 were greater than the combined totals of net exports in the previous five years.

CANADIAN EXPORTS OF ROLLED STEEL
AND ANNUAL TRADE BALANCES,
1975 - 1980

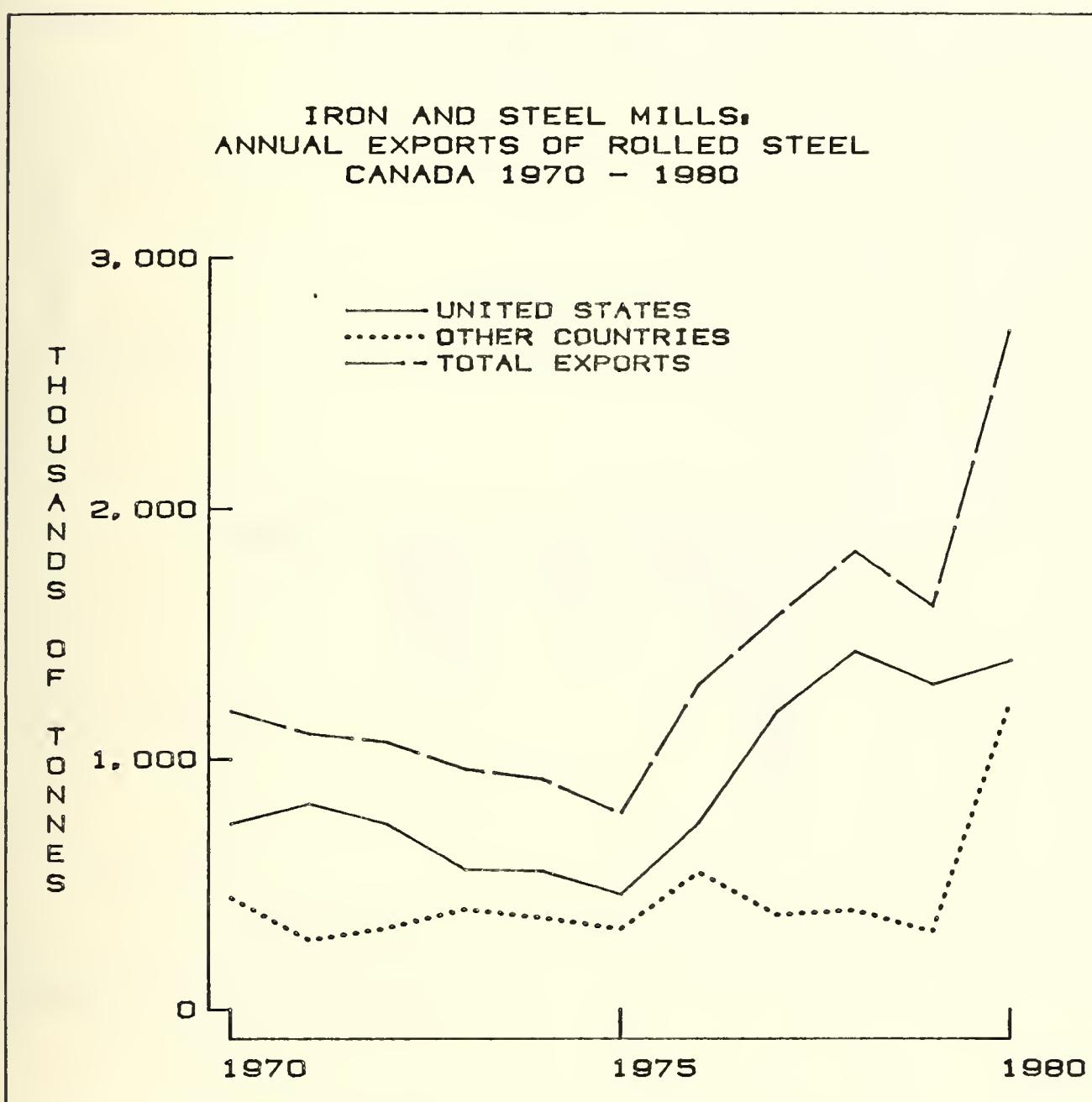
Table 39

Year	Imports 000's Tonnes	Exports (000's Tonnes)	Net Exports (000's Tonnes)	Exports as a Percent of Total Production	Exports as a % of Domestic Shipments
1975	1,340	861	-479	8.2	9.0
1976	1,136	1,426	290	13.2	15.2
1977	1,207	1,729	522	15.2	17.9
1978	1,288	2,016	728	15.6	18.5
1979	1,681	1,774	93	13.2	15.2
1980	1,066	3,018	1,952	22.3	28.7

Sources: Statistics Canada and Stelco .

The shift for Canada from a net importer to a net exporter of steel is a relatively recent phenomenon. Figure 17 shows Canada's position in tonnes of steel exported to all nations between 1970 and 1980. Exceptional growth in Canadian exports was achieved in the 1975-1980 period, when the average rate of growth was 28.5 percent per annum.

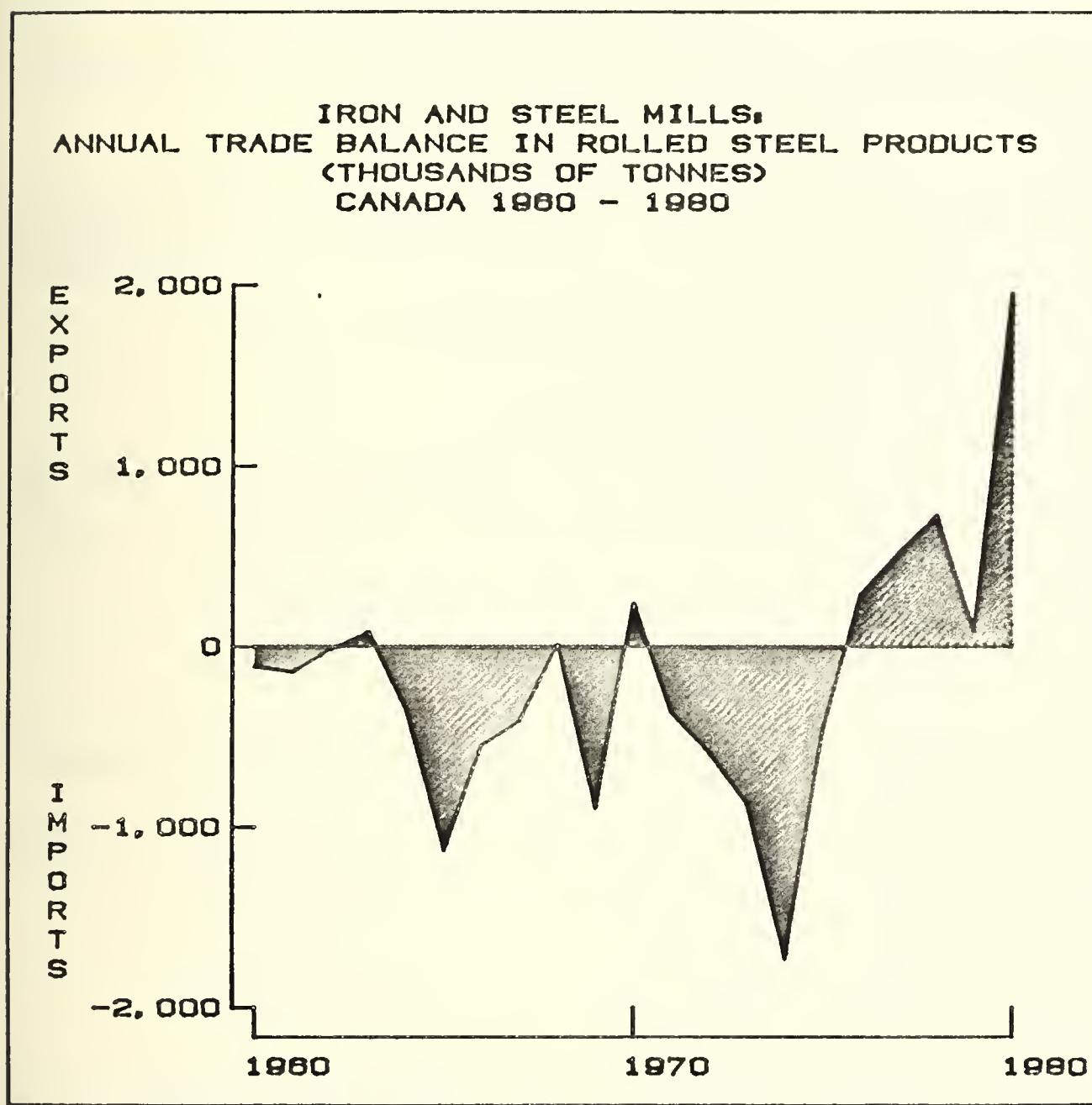
Fig. 17



SOURCE: STATISTICS CANADA

To get a complete picture however, overall trading of steel must be examined. Figure 18 shows that in the past few years Canadian steel mills have had a net export balance.

Fig. 18



As mentioned earlier, exports by non-producers play an important role in overall exports, but are not included in Table 39. An attempt is made in Table 40 to include exports by non-producers, and returnable exports (e.g. exports of slabs or ingots to the U.S. for rolling where the rolled steel is imported by Canada) to arrive at a realistic figure on actual trading position. With this methodology, the exports account for 24.6 percent of total producer shipments compared to the 22 percent figure reported in the raw data by Statistics Canada. The most interesting observation is that net exports in 1980 were 2,055,000 tonnes, up 256 percent from 578,000 tonnes in 1979.

**CANADIAN STEEL EXPORTS & IMPORTS
1979 & 1980
(000's Tonnes)**

Table 40

		<u>1979</u>	<u>1980</u>	<u>Percent Change</u>
Shipments:	Total by Producers (A)	12,230	12,295	0.5
Exports:	By Producers	1,620	2,745	69.5
	+ by Non-Producers	497	284	(42.9)
	- Returnables ¹	11	6	(45.4)
	= Total (Net) (B)	<u>2,106</u>	<u>3,022</u>	43.5
Shipments & Domestic Adjusted (A-B)		<u>10,123</u>	<u>9,273</u>	(8.4)
Imports:	Total Gross	1,817	1,112	(38.8)
	- by Producers	272	120	(55.9)
	- Re-exports	17	26	54.2
	= Total (Net) (C)	<u>1,529</u>	<u>967</u>	(36.8)
Apparent Domestic Supply A-B+C		<u>11,652</u>	<u>10,239</u>	(12.1)
Net Exports (B-C)		578	2,055	255.9
Exports as a % Total Producers Shipments		17.2	24.6	
Imports as a % Apparent Domestic Supply		13.1	9.4	

¹Producers exports (or imports) for conversion and return.

Source: Statistics Canada and A.E. Ames.

The growth in steel exports has allowed the Ontario steel industry to experience growth rates in capacity and production in excess of real domestic product and Canada's domestic demand for steel. The difference in the growth rates of Canadian demand and production is evident in Table 41. Between 1975 and 1980, Canadian steel production increased from 10.4 million tonnes to 13.6 million tonnes, an average annual rate of approximately 5.5 percent, well in excess of apparent domestic consumption which grew only at a rate of 1.3 percent.

**TOTAL CANADIAN PRODUCTION AND APPARENT CONSUMPTION OF ROLLED STEEL PRODUCTS,
1975 - 1980**

Table 41

Year	Total Production (000's Tonnes)	Apparent Canadian Consumption (000's Tonnes)
1975	10,382	10,861
1976	10,798	10,609
1977	11,376	10,855
1978	12,889	12,161
1979	13,481	13,388
1980	13,552	11,600

Source: Stelco Inc., 1980.

Exports played an important role in high capacity utilization rates for the Canadian steel industry. In 1980, more than 22 percent of total producers' shipments were for the export markets. This does not include: (i) the exports by non-producers and (ii) the exports of secondary and tertiary steel products. Canadian steel mills operated at 84.7 percent of capacity in 1980, down from the 1979 rate of 87.3 percent. Without such a mammoth increase in export rates, capacity utilization rates would have dropped below the break-even range estimated at 75-80 percent. With low rates of capacity utilization, Ontario steel producers would have suffered higher unit costs, a loss of competitiveness and financial losses throughout 1980.

Imported steel in 1980 accounted for 9.2 percent of Canadian apparent consumption, down from the 1975 level of 12.3 percent. (See Table 42) This decline in the share of imports of steel in Canada's domestic market continues a long term trend which has seen the proportion of Canadian steel demand met by foreign imports fall from approximately 23 percent in 1960 to 14 percent in 1970, and finally to its current level of just over 9 percent.

**CANADIAN APPARENT CONSUMPTION AND IMPORTS
OF ROLLED STEEL PRODUCTS,
1975 - 1980**

Table 42

<u>Year</u>	<u>Canadian Apparent Consumption (000's Tonnes)</u>	<u>Imports (000's Tonnes)</u>	<u>Imports as a Percent of Apparent Consumption</u>
1975	10,861	1,340	12.3
1976	10,609	1,136	10.7
1977	10,855	1,207	11.1
1978	12,161	1,288	10.6
1979	13,388	1,681	12.6
1980	11,600	1,066	9.2

¹Apparent Consumption = Domestic Shipments plus Imports.

Source: Statistics Canada and Stelco Inc., 1980.

Approximately 41 percent of the total Canadian imports of carbon steel in 1980 came from the U.S., 20 percent from Japan, 6 percent from West Germany and 5 percent from Belgium. Overall, Western Europe provided about 25 percent of total Canadian imports. U.S. steel mills provided almost 100 percent of ingots and semifinished steels, 90.5 percent of plates, 79 percent of cold rolled sheets and 67 percent of rails. Out of total 1980 imports, plates ranked highest at 22 percent, followed by hot rolled sheet at 20.3 percent. Other major types of steels imported included heavy structurals (17.8 percent), and wire rod (11.2 percent). These form types of steel accounted for a total of 71.2 percent of total steel imports. (See Table 43)

EXPORTS OF CARBON STEEL INTO CANADA BY TYPE
MAJOR SOURCE, 1980

Table 43

Type	From USA (Tonnes)	U.S.A. as % of Total	Type as a % of Total	% Change from 1979
Ingots & Semi-Finished	99,811	99.8	9.7	-43.7%
Structural Bars	15,676	66.9	2.5	+47.2
Structural Rods	10,669	10.0	11.2	-35.9
Structurals	33,302	19.7	17.8	-25.3
Structural - Ban.	11,985	78.4	1.6	-28.1
Construction - Reinforced	5,772	71.0	0.9	-63.9
Cold Rolled Bars	19,713	52.1	4.0	-41.4
Rolled Bars	4,020	48.4	0.9	-38.5
Plates, etc.	5,294	90.5	5.9	+24.2
Pipes (incl. pipes & tubes)	41,383	19.9	21.9	-45.9
Cold Rolled Sheet & Strip	100,627	52.2	20.3	-36.6
Rolled Sheet & Strip	40,500	79.2	5.3	-54.7
Galvanized Sheet & Strip	4,391	14.1	3.3	-65.0
	385,143	40.6	100	-40.2
Imports:	949,404			

SOURCE: Statistics Canada and A. E. Ames, Computer printout

The U.S. traditionally has been an important market for Canadian steel exports. In 1980, more than 75 percent of Canadian steel exports went to the United States. (See Table 44) However, the reliance on the U.S. as an export market is even higher in some specific products such as tie plates (98.1 percent of total exports were to U.S.); structural bars (95.1 percent); cold rolled bars (91.7 percent); and galvanized sheet and strip (83.8 percent). Structural bars are the largest of these examples, in terms of tonnage exported, representing approximately 10 percent of total steel exports, and are the only major type of material for which exports declined in 1980 from the previous year. It is important to note that exports of ingots and semi-finished forms were up 170 percent in 1980 over 1979, partially due to a lack of rolling capacity in Canada.

It is also apparent from Table 44 that third world nations, especially in Asia and Central American, are important export markets for a number of specific steel products including hot and cold rolled sheet and strip, ingots and semi-finished steel, rails and wire rods.

**EXPORTS OF CARBON & ALLOY STEEL FROM CANADA
TYPE & MAJOR DESTINATIONS, 1980**

Table 44

Type	To USA (Tonnes)	USA as % of Total	Type as a % of Total	% Change from 1979	Other Important Customers	
g ai ar ay n or Re ot ol e as ubes ot tp ol an tp t: ad	97,516 125,210 330,355 284,814 166,910 7,756 13,126 241,020 267,699 54,127 139,047 1,721,580 <u>3,019,793</u>	29.9 52.1 61.0 95.1 56.1 91.7 98.1 70.9 41.2 39.8 83.8 57.2	10.8 8.0 17.9 9.9 9.8 .3 .4 11.3 21.5 4.5 5.5 100	170.5 8.5 53.1 (10.3) 84.1 83.8 15.4 12.0 59.7 174.3 11.6 42.6	Asia & Far East South America Central America & Caribbean West Europe Asia & Far East Mid East Asia & Far East Asia & Far East Asia & Far East United Kingdom South America Europe	28.4% 10.9% 31.1% 16.6% 25.8% 14.8% 14.6% 22.3% 53.5% 6.1% 11% 7%

Source: Statistics Canada and A. E. Ames

The value of Canadian steel exports in 1980 was \$1,598 million, up 37 percent from the previous year. However, imports in this duration declined from \$1,225 million in 1979 to \$940 million in 1980. The overall Canadian trade balance in steel (SIC 291) improved by \$658 million as was illustrated in Figure 18. These figures do not provide precise information on the tonnage of steel because the average price of steel imported into Canada is usually much higher

than that of the average price realized per tonne of steel exported. In 1980, for example, average value per tonne of steel exported to the U.S. was \$478.78, as against \$743.89 per tonne of steel imported from the United States. (More detailed information on this issue is provided in Appendix H.)

Steel exports accounted for 2.1 percent of total Canadian exports in 1980, up from 1.5 percent in 1976. (See Table 45)

**CANADA: IRON AND STEEL MILLS (SIC 291)
EXPORTS AND IMPORTS, 1976 - 1980
(value in \$thousands)**

Table 45

<u>Year</u>	<u>% of Total Exports¹</u>	<u>Value</u>	<u>Imports</u>	<u>Trade Balance</u>
1976	582,656	1.5%	496,259	86,397
1977	759,611	1.7%	589,259	170,352
1978	1,070,171	2.0%	744,568	325,603
1979	1,166,200	1.8%	1,225,050	(58,850)
1980	1,597,807	2.1%	939,957	657,850

¹Includes re-exports on a customs value basis.

Source: Canada Department of Industry Trade and Commerce, Commodity Trade by Industrial Sector, Historical Summary 1966-1980, July, 1981.

Traditionally, a large proportion of Canadian steel exports are destined for the U.S. market, much of it via the Great Lakes customs clearing district. In 1979, for example, 82.3 percent of Canadian steel exports were destined to U.S. markets. These were valued at \$959 million. However, during the same year, \$600 million worth of steel was imported from the U.S., about 49 percent of the total value of imports. In 1980, the value of our steel exports to the U.S. declined as a percentage of total exports to 63.6 percent from 82.3% in 1979, even though the value of shipments increased by \$56 million to over \$1,015 million. This is due to the fact that Canadian exports of steel to other countries increased dramatically, to 36.7 percent of total exports, up from 17.7 percent in 1978. (See Table 46).

**CANADA: IRON AND STEEL MILLS (SIC 291)
EXPORTS AND IMPORTS WITH THE UNITED STATES,
1976-1980**

Table 46

<u>Year</u>	<u>Exports (\$000)</u>	<u>Exports to U.S. as a % of Total</u>	<u>Imports (\$000)</u>	<u>Imports from U.S. as a % of Total</u>
1976	379,645	65.2%	225,615	45.5%
1977	579,114	76.2%	265,765	45.1%
1978	852,222	79.6%	350,685	47.1%
1979	959,366	82.3%	600,444	49.0%
1980	1,015,574	63.6%	498,518	53.0%

Source: Canada. Department of Industry, Trade and Commerce, Commodity Trade by Industrial Sector with the U.S. Historical Summary 1966-1980, July 1981.

Thus, in 1980, absolute Canadian steel exports to the U.S. increased; imports from the U.S. declined; and exports to all other countries increased to an all time high of 1,481,000 tonnes, up 333 percent from 342,000 tonnes in 1979.

B) The United States Market

The United States is the only western world nation that does not have adequate steel making capacity. The Japanese have taken over from the U.S. as the largest steel producer in the world. In 1980, the United States produced 111.8 million tonnes of raw steel and 83.9 million tons of finished steel. In that same year, the U.S. imported 15.5 million tons of steel, down substantially from 17.5 million tons in 1979 and 21.1 million tons in 1978. Despite steep declines in total imports of steel in the U.S., Canadian exports to that country continued to increase. Overall apparent steel consumption in the U.S. in 1980 was 95.3 million tons, almost 8.5 times the comparable Canadian figure.

Americans place great importance on their steel industry and are somewhat embarrassed at the poor shape of the industry. The sentiments of Americans are well expressed in a speech by Mr. Jacks, Chairman, Inland Steel:

"(The steel industry) rates second only to the motor vehicle industry in importance to the (U.S.) economy... Probably the key import statistic affecting the overall performance of domestic producers is market penetration. From a level of under 5 percent in 1960, imports peaked at 18 percent in 1971. They dropped back during the world shortage in 1973-74, when foreign producers turned homeward and found more favorable markets elsewhere, and incidentally charged exorbitant premiums for much of their continued U.S. shipments. Again, last year (1977) a record tonnage of 19.3 million tons was imported, with the percentage of domestic supply climbing to 24 percent in December."¹

Such increases in imports are blamed by the American steel industry on unfair trade practices by foreign steel-making firms including "tax rebates, border taxation of imports, intricate financing schemes, and discriminatory quota agreements".² However, the problem is not caused by the foreigners alone. It is also a domestic problem of old, inefficient plants operating with highly paid labour by a management which has not kept adequate funds from earnings for reinvestment.

The troubles of the U.S. industry resulted in widespread layoffs and plant shutdowns in early 1977. The initial response of the U.S. Administration was to urge the industry to initiate anti-dumping actions under The Trade Act of 1974. In total, 17 charges were laid during the period. Later, the President created an inter-agency task force under pressure from the Congress, the Steelworkers Union and the general public. The task force, headed by the Under Secretary of the Treasury, presented a report to the President in December 1977 entitled, "A Comprehensive Program for the Steel Industry". One of the key recommendations was to provide relief from unfair imports by the creation of a "trigger-price" mechanism (TPM).

¹Frederick Jacks, "The Steel Import Problem: The Steel Industry Viewpoint", paper delivered at the Kent State Steel Seminar 1978. Proceedings, p. 4

²Ibid. p. 9

The TPM was to overcome the difficulties posed by the Trade Act which authorized the International Trade Commission (I.T.C.) to determine if there had been an injury to a domestic producer. The Act is oriented to specific products coming from a specific country. In other words, complaints against carbon steel imports from France and ultimate dumping findings cannot be used to decide if similar steel coming from Germany is below fair price, or whether hot rolled steel from France is below price. Thus domestic industry was supposed to charge each country for each product if need be. This was a lengthy, expensive and time consuming arrangement, especially so because the ITC must prove (a) sales at less than fair value, and (b) injury to the domestic industry.

The TPM was created in 1978 and is self-initiating. It is based on the production costs of the six most efficient Japanese steel producers for producing 32 types of steel. A base price is calculated by type of steel, with additional charges for extras such as surface preparation, and transportation to the U.S. It thus becomes a composite price against which all imported steel is compared, based on the charges on the date of export. Moreover, when imports exceed 13.3 percent of domestic sales, a new 'surge' provision permits the federal Commerce Department to investigate trigger prices enforcement. When penetration is above 15.2 percent, the department must determine whether the increase is a result of injurious dumping.

At present, fabricated products to the United States are not covered by the TPM, therefore an inefficient steel producer could fabricate a product of steel and export it to the U.S.

Most Canadian steel mills, including Algoma, Dofasco and Stelco have, received pre-clearance from TPM by opening their books to the U.S. Commerce Department to show that Canadian steel can be delivered to U.S. markets at below TPM rates. This saves a lot of paperwork and also enables U.S. steel customers to obtain Canadian steel without much delay. Many European steel-makers have been seeking such pre-clearance, without success. However, the recent sizeable depreciation in the value of most European currencies against the U.S. dollar may result in pre-clearance to these nations. Regardless of pre-clearance, the Europeans can compete effectively with Canadian steel products in the U.S. markets.

The TPM favours Canadian steel-makers, as shown by the example in Table 47 worked out by Gordon Securities.

TPM AND CANADIAN EXPORTS TO THE U.S.

Table 47

	Rolled Sheet	Rolled Sheet
Trigger Price, QII, 1981	\$US495	\$US 440
U.S. Price, F.O.B. Customer in U.S.	\$US474	\$US 427
Canadian List	\$ 450	\$ 394
Freight	\$ 14	\$ 14
Tariff	<u>\$ 30</u>	<u>\$ 29</u>
Canadian Price F.O.B. U.S. Customer	\$ 494	\$ 437
Official Rate U.S. equivalent:	\$US412	\$US 365
Price Charged	\$US425	\$US 376
Savings to U.S. Customer	10%	12%
Premium to Canadian List	3%	3%

Source: Gordon Securities

Recently, many U.S. steel-makers have been trying to convince the U.S. administration to end this privilege to Canadian firms. The French have been testing how far the U.S. administration can be pushed by exporting steel products below the TPM price guidelines.

The U.S. administration is trying to revive the steel industry and has proposed many measures such as: (a) a tax break on capital investment (a 40 percent liberalization of depreciation allowed, and an extra 10 percent in investment tax credits in distressed areas); (b) postponement in the enforcement of costly environmental regulations by up to three years; and (c) aid for the jobless steelworkers and their communities.

The Canadian steel industry's dependence on the U.S. markets has reached unprecedented proportions. This has inherent risks for the Canadian steel exporters. The U.S. steel industry is being revived by massive investments and rationalizations. It is evident that the industry is on the recovery path. In the first seven months of 1981, U.S. industry's capacity utilization was 83.7 percent, up 10.1 percentage points from 73.6 percent in the first seven months of 1980. Steel production to the end of July 1981 was 76.1 million tons, up 15 percent from 66.3 million tons over the same period in 1980.

Thus, the main concerns from a Canadian steel exports point of view are:

- o Domestic production in U.S.A. is up, but the demand for steel has not improved. The U.S. economy has not shown any signs of recovery. Much of the growth in the U.S. economy is in high technology areas and defense. Both of these add little to demand for steel. Auto construction is very weak. Energy projects are strong and thus the demand for pipe and tube is high, but Canada is a net importer of such products.
- o The U.S. mid-west is the traditional market for Canadian steel. This area however is extremely weak and is losing ground to the sunbelt states. Canadian steel cannot effectively compete in those areas with steel from Japan or the EEC.
- o The U.S. administration is flexing its muscle against the Canadian energy policy of greater Canadian control of the domestic energy sector. On August 8, the Assistant Secretary of Commerce of the U.S. administration, Mr. Waldmann, suggested to Canadian authorities that the U.S. may consider countermeasures, including abandoning of the U.S.-Canada auto pact and emergency powers for the President (of the U.S.) to alter any plans the Canadians might have to impose some restrictions on U.S. investment in Canada.

The major factor in the development of a net export position for the Canadian steel industry has been the fall in value of the Canadian dollar against the exchange rates of Canada's major international competitors in steel - The United States, Japan and the EEC. (See Table 48)

VALUE OF THE CANADIAN DOLLAR IN
FOREIGN CURRENCIES, 1976-1981

Table 48

<u>Year</u>	<u>U.S. Dollar</u>	<u>Japanese Yen</u>	<u>German mark</u>	<u>French Franc</u>	<u>British Pound</u>
1976	1.014	300.6	2.55	4.84	.560
1977	.940	251.3	2.18	4.62	.540
1978	.872	182.5	1.76	3.95	.460
1979	.854	186.0	1.56	3.63	.400
1980 (Dec.)	.836	174.9	1.64	3.61	.360
1981 (Sept. 10) mid market	.83	192.6	2.00	4.80	.462

Between 1976 and December 1980, the Canadian dollar fell in value nearly 18 percent against the American dollar, 42 percent against the Japanese Yen, 36 percent against the German Mark, 25 percent against the French Franc and 36 percent against the British Pound. Steel producers in Ontario, correspondingly, were able to expand steel shipments into the United States and into third world countries such as Brazil and Argentina.

The value of the Canadian dollar has remained low and relatively stable in the 81 to 83 cent range against the U.S. dollar. Yet the U.S. currency gained considerably within the past year against most foreign currencies. Consequently, the value of Canadian dollar has improved against European currencies. Changes in the value of the Canadian dollar, against some selected currencies between July 1980 and July 1981, were reported by the Financial Post on August 8, 1981 as:

British Pound	+	19.8%
Austrian Schilling	+	29.6%
Belgian Franc	+	33.7%
French Franc	+	19.7%
German Deutsche Mark	+	30.7%
Brazilian New Cruzeiro	+	68.0%
Argentinian Peso	+	130.0%

The danger for Ontario's steel industry is clearly that with the recent strengthening in the value of the Canadian dollar against European currencies, Canadian steel producers may lose their favourable position in U.S. and third world country steel markets. If such markets are lost to Japanese and EEC steel producers before Canada's domestic demand for steel recovers sufficiently to utilize existing capacity expansions, the Ontario industry will begin to experience the low level of capacity utilization and loss of profitability currently evident in the EEC and Japan.

C) Canadian Steel Tariffs

The Canadian tariff on steel products as of July, 1981 was designed for four basic product groups: bars or rods; structural shapes; plate; and sheet and strip. The most favoured nation (MFN) rates of duty on these main tariff items were 10 percent, the same level as in 1967 following the Kennedy round of GATT negotiations. Rates on more highly processed steel products are set above those on the four basic product groups and range from 12.5 to 17.5 percent. Again, these rates have remained relatively stable since 1967. (Table showing the rates is in Appendix H).

Several reductions in the Canadian steel tariff have been agreed to under the Tokyo Round of the GATT trade negotiations. These tariff reductions originally were to take effect as of January 1, 1982. However, because of the depressed conditions of the steel industry world-wide, most participating countries have agreed to introduce Tokyo Round tariff reductions only gradually over a 5-year period from January 1, 1982 to January 1, 1987. Under this scheme, small tariff cuts will be introduced annually until the agreed rates are reached by January 1, 1987.

In general, the Tokyo Round provided for an average reduction of industrial tariffs by some 33 percent, with the largest reductions in items with the highest existing rates of duty. Correspondingly, Canada has agreed to reduce its MFN rate on the four basic product groups from 10 percent to 6.8 percent, a reduction of 32 percent. Rates on more highly processed steel products will be reduced by even larger amounts, falling from a range of 12.5 to 17.5 percent in 1981 to a range of 8 to 10.2 percent in 1987.

Therefore, as a consequence of the Tokyo Round of GATT negotiations, Ontario's steel industry over the next five years will face a gradual reduction in its level of tariff protection. It is not, however, likely that these tariff reductions will have a major impact on the competitiveness of Ontario steel in Canadian markets. For example, a reduction in the steel tariff from 10 to 6.8 percent will only provide foreign steel producers with a 3 percent reduction in their final price in Ontario. With a five year introduction period, Ontario steel producers should have sufficient time to make the necessary competitive adjustments. Such reductions in Canada's tariff on steel products could only have significant effects in product markets (e.g. specialty steels) and regions (e.g. British Columbia, Atlantic Canada) where Ontario steel producers are in the position of marginal suppliers.

As a final comment it might be argued that Ontario's steel industry is no longer in need of continued high levels of protection. The tariff protection was justified on the grounds that the steel industry was in its 'infant' stages, and required protection from international competition in order to develop and to replace imported products in the domestic market. Now, Ontario's steel industry has reached a stage where it no longer requires tariff protection. Continued tariff protection just increases the cost of steel to the importer who is often a domestic manufacturer. The removal of this additional cost will provide an additional competitive advantage to exports of manufactured products. It is recommended that the issue of tariff protection to the steel industry be examined in depth, with emphasis on its potential impact to the manufacturing sector of Ontario.

D) Transportation Rates

The competitiveness of steel in any particular market depends on the final delivered price - a composite of base price and freight rates. Given that the Canadian steel market is widely spread geographically and that Ontario's steel industry is regionally concentrated, overland freight rates may play a role in determining the market for Ontario steel in more distant parts of Canada (eg. British Columbia, Atlantic Canada). As transport costs increase with distance, sales of Ontario steel products in geographically peripheral areas may be lost. On the beneficial side, overland freight rates also serve to insulate Ontario steel producers in their major markets (ie. Ontario, the Prairies, and the U.S. Mid-West) from imports by more efficient producers such as the Japanese firms .

The marginal nature of the geographically peripheral markets is perhaps best demonstrated by an examination of rail freight rates to Edmonton and Vancouver from the major steel-producing centres in Ontario (Sault Ste. Marie and Hamilton), as is set out in Table 49.

**RAIL FREIGHT RATES ON SELECTED STEEL PRODUCTS
TO EDMONTON AND VANCOUVER: JUNE 1981
(\$ Per Tonne)**

Table 49

Product	Hamilton to Edmonton	Hamilton to Vancouver
1. Structural Steel and Plate	4.74	4.55*
2. Pipes and Tubes (16" or less in diameter)	5.29	4.93
3. Pipes and Tubes (16 - 60" in diameter)	5.90	6.80
Product	Sault Ste Marie to Edmonton	Sault Ste. Marie to Vancouver
1. Structural Steel and Pipe	4.50	4.55*
2. Pipes and Tubes (16" or less in diameter)	4.61	4.95
3. Pipes and Tubes (48-60" in diameter)	n.a.	6.80

*Special rates.

Source: Canadian Pacific and Canadian National Railway tariff quotations. Rates apply to 100,000 tonne shipments by flat-car.

Two interesting observations are made from Table 48. First, rail rates to Vancouver from either Hamilton or Sault Ste. Marie are nearly identical for the products listed above. This neutralizes any distance advantage Algoma might have in serving western steel markets, and reflects the railways' policy of setting freight rates based on what the traffic will bear. In other words, at higher freight rates, steel from Hamilton would not be competitive and thus, would not move to the B.C. market. Second, for certain products, rates to Edmonton (the shorter distance) are higher than rates to Vancouver. This long-handed/short-haul discrimination also reflects the higher level of competition faced by Ontario steel producers in the B.C. market. That is, west coast steel consumers can obtain freight rate concessions by the threat of importing foreign steel using ocean transport.

Regarding the influence of transportation rates on trade flows of steel in the Canadian market, it may be useful to examine, in Table 50, prices quoted at Canadian steel mills on a number of products.

**SELECTED STEEL PRODUCTS
MILL PRICES AS OF MARCH, 1981
(Canadian Dollars)**

Table 50

Product	Price Per Tonne
1. Structural Steel (Wide Flange Beams)	\$535.40
2. Plate	\$442.00
3. Galvanized Sheet	\$634.00

Steel prices at the mill range from approximately \$440 to \$640 per tonne while freight charges to Alberta and British Columbia range from \$4.50 to \$7.00 per tonne. In short, freight charges to the west coast may add from 1 to 2 percent to the delivered price of steel to the west coast, a minor factor in the competitiveness of Ontario steel in the Canadian west.

VI MAJOR FOREIGN STEEL PRODUCERS

A. Third World

The Third World countries place great importance on being self sufficient in steel production as a major steel mill becomes a symbol of national pride. Third world nations like China, Brazil, India, and Mexico are now included in the top 20 steel-making countries of the world. Their steel industries have reached such sizeable capacity with very little assistance from international associations.

The Japanese steel-makers, now faced with export restrictions to Europe and the U.S.A., have started an aggressive program of selling steel-making technology, particularly to less developed countries. "In the Japanese steel industry, the guiding philosophy now is to beef up divisions handling design and to build integrated steel works for developing countries by offering package deals, including technology licensing, feasibility studies, construction and engineering advice. By selling experience gained in building their own highly-efficient industry, Japan's Big Six steelmakers are hoping to make up for the expected low levels of crude steel demand in the coming years".¹

Usually, the government of a Third World nation will prepare long range plans to develop a viable steel industry of its own. It sometimes requires large sums of assistance from the public sector or direct government equity. In India, for example, primary steel manufacturing is nationalized and The Steel Authority of India operates all plants. The federal government prepares five year plans for overall economic activity, including steel sector growth. Similarly, Mexico has the "Steel Coordinating Commission" which assists all private or public companies in all aspects of primary steel-making. The Commission is credited with the creation of two large integrated steel mills, and the development of many raw material sources. On completion of these facilities, Mexico will become a net exporter of steel. One of the two plants, with a first stage capacity of 1.2 million tonnes, is being built with funds borrowed from the World Bank and SICARTSA, a Mexican publically-owned enterprise. Mexican production of crude steel grew from 3.5 million tonnes in 1969 to over 7 million tonnes in 1979, representing an annual compound growth

¹Tracy Dahlby, "Japan Seeks a Long-Term Strategy for Prosperity", Far Eastern Economic Review, August 25, 1978.

rate of 7.3 percent.¹ In March 1981, Sidermex, the Mexican government steel company, announced plans to spend \$2.73 billion to increase capacity at existing plants by 11 million tons, and \$6.55 billion to build a new steel plant near Altamira with a capacity of 6.6 million tons. This will triple Mexico's steel-making capacity in the next few years.²

Similarly, Brazil had a program to increase its raw steel production capacity to 20.2 million tonnes by 1980.³ Brazilian steel production between 1969 and 1979 increased from 4.9 million tonnes to 13.9 million tonnes, a compounded growth rate of 13.9 percent per annum. These planned capital programs were undertaken by government owned mills with loans from the World Bank and the Inter-American Development Bank which are guaranteed by the Federal Republic of Brazil.

South Korea provides another interesting example of achievement in the national goal of steel-making. The World Bank refused loans for a fully integrated computerized steel plant on the grounds that the project was unfeasible. After much effort, South Koreans achieved private funding to buy the latest steel-making technology from Japan. The steel mill at Pohang started production in February 1981, months ahead of schedule and well within budget. This mill added 3.3 million tonnes of annual capacity to South Korea's steel-making capacity, which now stands at 11.5 million tonnes. The cost per ton of annual capacity at this mill is estimated to be \$465 U.S. per tonne, which compares very favourably with \$1100 per tonne in the United States. South Korea plans to expand production to 19 million tonnes by 1985. In September 1981, Pohang Iron and Steel Company launched the fourth phase of the expansion program. "The expansion will increase the mill's annual crude steel capacity 1.1 million tons, to 9.6 million tons."⁴ At present, South Korea's domestic demand is believed to be just below 9 million tonnes. (See Table 51)

¹IISI, Steel, Statistical Yearbook 1980, Table 2.

²Wall Street Journal, March 30, 1981.

³U.S. Congress, 'Technology and Steel Industry Competitiveness,' OTA Report, p. 69. It is not known whether this goal has yet been achieved.

⁴Wall Street Journal, September 3, 1981.

SOUTH KOREA STEEL PRODUCTION CAPACITY AND DEMAND
1981-1991 (million tonnes)

Table 51

<u>Year</u>	<u>Demand</u>	<u>Capacity</u>
1981	8.99	11.50
1985	13.75	19.00
1991	19.65	n.a.

Source: Lehner, Iron Will, Wall Street Journal, May 13, 1981.

According to an OECD report on steel, "In 1979, total crude steel production in these areas (developing countries excluding China and North Korea) increased by about 15 percent. Growth was particularly high in Venezuela (+60%), South Korea (+53%) and Taiwan (+24%). The average rate of capacity utilization was high and in most of these areas production was close to the maximum possible."¹

The steel industries of these developing countries will become a major force to reckon with in the export market. It has been estimated that steel-making capacity in Less Developed Countries (LDC's) will total 112 million tonnes in 1985 as compared with 64 million tonnes in 1978², which represents a growth rate of 8.3 percent compounded annually. The United Nations International Development Organization (UNIDO) estimates that Brazil, Iran, Argentina, Venezuela, India and South Korea will collectively contributed 54 million tonnes of additional steel-making capacity between 1979 and 1985.

The growth in steel-making capacity in the developing countries is not often matched by similar increases in consumption. Steel consumption in the Third World is expected to increase at a rate of 6.5 percent per annum, according to a U.N. study for the 1979-1985 period, as against 8.5 percent annual change in production. The additional capacity is thus used to reduce imports and to export the excess steel. A recent U.S. Congress report states that "efforts in LDC's to attain economies of scale have contributed to the creation of steelmaking capacity in excess of current world demand."³ (See Table 52)

¹OECD, The Steel Markets in 1979 and the Outlook for 1980, p. 14.

²Central Intelligence Agency, "The Burgeoning LDC Steel Industry: More Problems for Major Producers", 1979. Reported in U.S. Congress' OTA Report p. 132.

³OTA Report, p. 132.

**RAW STEEL CAPACITY
AVERAGE ANNUAL GROWTH RATES
1969-1979**

Table 52

Western Europe	1.1
Eastern Europe	4.9
U.S.S.R.	3.1
North America	0.1
Latin America	8.6
Africa	7.9
Mid East	18.4
Asia	5.0
Asia without Japan	9.5

Sources: OECD, The Steel Market in 1979 and The Outlook for 1980, p. 14.
IISI, Steel Statistical Yearbook 1980, table 2.

These countries will provide stiff competition in the 1980's to major steel producing countries of the world, including Canada. They have the latest technology on their side and possess the required raw materials. In addition, developing nations can provide fabrication and manufacturing with the steel they produce, the finished or semi-finished parts being shipped to the west for assembly. Sri Lanka is enticing manufacturers from the western world to establish plants, with a 10 year complete tax holiday. Only one government authority will deal with all such manufacturing concerns. The cost of labour in Third World countries is extremely low (e.g. \$35 U.S. per worker per month in Sri Lanka). Moreover, these countries have good training facilities. The shortages of capital in these third world countries is somewhat of a problem. However, the Japanese with their large trade surplus, are eager to help. For example, in September 1981, the Japanese prepared a \$1.21 billion loan package for a steel mill in mainland China.

The potential of a challenge from the third world to major manufacturing sectors (like Ontario) is formidable. It may be a useful exercise to examine the potential threat to Ontario's manufacturing sector posed by rapid growth in the third world to over the next few years, and the steps that may be needed to circumvent it.

B. Japan

The post-war growth of Japan's steel industry has been an integral part of that country's overall industrial strategy. That strategy called for a rapid growth in manufacturing output with a great emphasis on high value added sectors. Responsibility for economic policy in Japan is divided between the Economic Policy Agency (responsible for development of medium or long term economic plans), the Ministry of Finance (responsible for establishing a framework of macroeconomic policies), and the Ministry of International Trade and Industry or MITI (responsible for establishing specific industry or sector strategies). Insofar as there is a specific "steel policy" in Japan, it is the creation of the latter Ministry.

Japan's steel policy itself is based primarily on three planks. MITI decided that (in the long term) Japan's comparative advantage lay in the establishment of capital-intensive high technology industries, and that 'favoured sectors' be established and encouraged through a range of preferential governmental policies such as accelerated depreciation and other deductions from export income, and tax credits for R&D. The steel industry was identified as a 'favoured' sector.

The Japanese government has acted to guide significant flows of capital to the 'favoured' sectors through control of its own financial institutions (e.g. The Japan Development Bank) and through the Bank of Japan and moral suasion over the commercial banks. Japan's iron and steel sector benefitted correspondingly from an increased flow of funds, predominantly in the form of bank loans. In the interests of national economic policy, Japan's commercial banks have been willing to allow the steel industry to operate with levels of debt far in excess of those allowed by North American banks. For example, Japan's seven largest steel companies indicate a ratio of equity to total capitalization of about 14 percent (See Table 53), compared with customary levels of approximately 40-70 percent in Canada.

FINANCIAL PERFORMANCE: JAPANESE STEEL COMPANIES¹ 1978 and 1979

Table 53

<u>Rank²</u>	<u>Company</u>	<u>Year</u>	<u>Sales (\$ U.S. M)</u>	<u>Assets (\$ U.S. M)</u>	<u>Net Income (loss) (\$ U.S. M)</u>	<u>Equity (\$U.S. M)</u>	<u>Employees (000's)</u>	<u>Return on Assets (%)</u>
1.	Nippon Steel	1978	9,522	15,434	56.9	1,865	80.6	0.4
		1979	12,595	16,413	243.6	3,199	78.6	1.5
2.	Nippon Kokan	1978	5,072	6,002	(133.5)	1,296	77.4	-2.2
		1979	6,503	6,733	(86.6)	1,254	79.2	-1.3
3.	Sumitomo Metal Industries	1978	4,837	10,305	18.8	823	43.9	0.2
		1979	5,342	9,040	85.0	760	42.7	0.9
4.	Kawasaki Steel	1978	3,745	7,657	27.9	752	37.3	0.4
		1979	4,795	8,060	86.7	798	35.9	0.9
5.	Kobe Steel	1978	4,175	6,363	21.1	546	39.3	0.3
		1979	4,411	5,909	68.0	634	32.4	1.2
6.	Nisshin	1978	1,161	1,795	21.4	213	11.4	1.2
		1979	1,543	2,068	46.4	305	11.0	2.2
7.	Daido Steel	1978	1,115	1,317	9.4	109	11.0	0.7
		1979	1,501	1,256	14.	109	10.6	1.2

1 Note: Includes only those companies listed in Fortune's 500 Largest Industrial Corporations Outside the United States.

2 Note: Rankings accord with value of 1979 sales in \$U.S.

Source: Fortune, August 13, 1979, and August 11, 1980.

The industry and the government in Japan enjoy a close and cooperative relationship. Under such arrangements, the steel industry has been encouraged to expand production capacity rapidly in line with a rapid increase in domestic demand for steel, and to rationalize or consolidate production facilities. For example, the MITI made strenuous efforts to merge two giant steel firms, Yawata and Fuji, to form the Nippon Steel Company - a fact somewhat comparable to combining Canada's two largest producers — Stelco and Dofasco. The objective of the Japanese merger was to establish the world's largest producer of steel.

In comparison, the communication channels between the industry and the government in Canada are not efficient. The president of Dofasco, F.H. Sherman, described the situation as follows:

"We continue to seek and encourage improved communication and cooperation between government and business in the belief that such measures are good for Canada and can help to reduce business uncertainty. Governments at all levels must continue to develop policies that will lead to greater utilization of productive capacity and increased levels of real growth."¹

The industry has publically expressed a desire to improve communications with the government, but the government of Ontario has not responded. Action in this area is urgently needed.

Under this growth environment, the Japanese steel industry expanded its output by 98 million tonnes in the 20-year period between 1955 and 1974. This increase represents an average annual growth rate of 13.5 percent. By comparison, over the same period, steel industry output in Canada increased at an average compound rate of 7.3 percent per annum, while the EEC and United States experienced even slower growth rates of 3.0 percent and 1.1 percent respectively. (See Table 54)

¹Dofasco, Annual Report, 1980, pp. 4-5.

CRUDE STEEL PRODUCTION IN OECD COUNTRIES
(millions of tonnes)

Table 54

	<u>1955</u>	<u>1960</u>	<u>1965</u>	<u>1970</u>	<u>1974</u>	<u>1980</u>
Japan	8.5	20.0	37.4	84.6	106.2	100.7
Canada	3.7	4.8	8.3	10.2	12.3	15.2
U.S.A.	96.3	81.7	108.0	108.0	119.9	107.0
E.E.C.	66.3	89.0	103.4	124.8	120.3	119.8
Other	6.2	10.3	14.2	21.7	28.2	31.4
OECD (TOTAL)	183.2	209.2	276.3	355.9	415.1	381.9

OECD, The Steel Market in 1979 and The Outlook for 1980 (OECD, Paris, 1980).

MITI also directs imports of latest technologies to the favoured sectors. In the case of the steel industry, MITI encouraged diffusion of basic oxygen furnace (BOF) technology. One Japanese steel company was selected as an exclusive licensee of BOF technology in Japan, and was required to sub-license that technology to any of the Japanese steel companies desiring it.

The success of the Japanese in adopting new technologies may be measured by the proportion of steel produced by the basic oxygen furnace (BOF) process, and by the proportion of its steel production subject to continuous casting techniques. The Japanese steel industry eliminated steel production by inefficient open-hearth methods in 1977. (By comparison, Stelco's Hilton works produces 50 percent of its steel by the open hearth process.) Moreover, in 1980 over 60 percent of Japanese steel output was casted by continuous casters. By comparison, the proportion of crude steel output subject to continuous casting is approximately 20 percent in Canada, and 17 percent in the United States. (See Table 55)

CRUDE STEEL PRODUCTION BY PROCESS, 1979

Table 55

Country	BOF Technology (% of Total Production)	Continuous Casting (% of Total Production)
Japan	76.4	52.0
Canada	56.7	19.9
U.S.	61.3	16.7
West Germany	76.1	39.0
France	79.7	29.5
EEC	71.4	30.9

Source: International Iron & Steel Institute, Steel, Statistical Yearbook 1980, pp. 5,7

The oil crisis in 1973-74 reduced the strength of the Japanese steel industry. The Japanese made long range plans to improve their efficiency and rationalize their production facilities. Consequently, from 1974 to 1979, the Japanese:¹

- . reduced energy consumption per tonne of steel produced by 10 percent as against a 5 percent reduction by Ontario steel companies;
- . reduced oil consumption/tonne of steel produced by 51 percent;
- . increased labour productivity by 18 percent;
- . increased the ratio of steel production subject to continuous casting from 20.6 to 52.0 percent (at the end of 1980, the rate was over 60 percent); and
- . increased the proportion of high quality and high price steel in their product mix from 12 to 16 percent.

The energy savings in the Japanese steel industry provides a good example for steel-makers in the rest of the world. Moreover, western nations can learn from eastern nations like Japan various ways to improve production, just the way the east did in the 1950's. The Japan Productivity Centre was created in 1955 and immediately it sent missions to the United States to learn about all aspects of the steel industry. Not many American firms are paying pilgrimage

¹Y. Kitao, K. Omura, The Japanese Steel Industry (Nomura Securities Co. Ltd., Tokyo, Japan, February 1981), Chart 4, p. 9.

to their old students to learn new techniques. Armco made formal arrangements in this direction with the Japanese steel-makers. Ontario could (a) consider the creation of Industrial Productivity Improvement Centres, and (b) encourage Ontario steel companies to make arrangements with the Japanese to learn their energy conservation methodology and other productivity and quality improvement measures.

The Japanese steel industry's output in 1980 was 100.7 million tonnes, for a capacity utilization rate of 71.8 percent, which is slight improvement from 1978 levels but below the 1979 rate of 73 percent.(See Table 56)

The outlook of Japanese steel industry is important to Ontario steel-makers because Japanese steel competes with Ontario steel in the western provinces of Canada and the United States. Because of current excess in production capacity in Japan, production cost superiority, and product quality advantages, Japan remains able to improve its competitive position in western markets against Canadian products.

C. EEC

Industrial strategies for steel in the EEC are influenced strongly by the Commission of the European Economic Community which, under the Treaty of Paris, has responsibility for the management of the European steel industry. Under Article 5 of the Treaty, the Commission was to guide and assist the industry by obtaining information, organizing consultation and laying down general objectives; provide financial assistance for investments in capacity and new technology; and to ensure "normal competitive conditions" by exerting a direct influence on production and/or upon the market.

THE JAPANESE STEEL INDUSTRY
1978-1980

Table 56

	<u>1978</u>	<u>1979</u>	<u>1980(est.)</u>
Crude Steel Production (m. tonnes)	92.6	101.4	100.7
Apparent Steel Consumption (m. tonnes)	64.0	76.3	78.0
Exports of Steel (m. tonnes)	36.5	36.0	34.5
Imports (m. tonnes)	0.5	1.7	1.4
Net Trade Balance (m. tonnes)	36.0	34.3	33.1
Utilization Rates	67.5	73.0	71.8
Exports to U.S.A.	6.8	6.6	n.a.

OECD The Steel Market in 1979 and the Outlook for 1980, IISI, Steel: Statistical Yearbook, 1980.

To correct persistent oversupply of steel in the EEC, the Commission in 1977 set forward a set of steel policy measures that came to be known as the 'Davignon Plan'. The plan involved 'crisis' measures aimed at four objectives:

1. to prevent the emergence of trade barriers between regions;
2. to modernize aging and obsolescent plant and equipment;
3. to re-train and re-deploy unemployed workers; and
4. to stabilize steel markets through direct intervention such as the prevention of the building of additional capacity.

The EEC Commission has more extensive powers to manage the European steel industry than the Common Market authorities have under the Treaty of Rome creating the EEC. Perhaps the most dramatic of the Commission's powers are those under Article 58 of the Treaty of Paris under which the Commission can, in the event of a steep decline in demand, declare a state of "manifest crisis", and can then adopt powers to impose a system of production quotas. These quotas can be reinforced by fixing a minimum price for steel (to prevent dumping) and by imposing controls on imports into the EEC. The Commission has the power to impose large fines on individual companies which break the quotas.

In July 1980, in response to sharp declines in world demand for steel, European steel-making companies broke out of the voluntary production cutbacks and minimum prices agreed to in the Davignon Plan. Production volumes were maintained while prices were cut substantially. To restore stability in the European steel industry, the French Government requested the EEC to consider the imposition of mandatory production controls on steel production. The EEC had earlier tried to persuade producers to agree to a 10 percent production cut voluntarily. However, this proposal was opposed by West Germany and Italy (which had just opened an efficient steel mill). Consequently, the EEC Commission imposed compulsory quotas in October 1980, to last through to June 1981. It required that the production of steel be cut by 14 percent in the last quarter of 1980, compared with the same period in 1979. Steeper production cuts were imposed for 1981. In addition, the Commission requested increased financial grants from member countries in support of programmes of adjustment assistance for displaced workers, and the orderly elimination of excess capacity.

Many EEC countries have the practice of providing government subsidies to their steel industry. West Germany, where there is little direct government support for the steel sector, has been a major critic of government aid to EEC steel companies.¹ France's Socialist Government, on the other hand, has supported subsidies to its steel sector in light of "the social effects of the steel crisis."²

¹Journal of Commerce, March 31, 1981. An executive of Salzgitter, a German steel producer, is quoted as estimating that EEC steel companies have received some \$34.2 billion in subsidies since 1974.

²Wall Street Journal, June 12, 1981.

The European steel industry has been incurring large losses, as shown in Table 57. Consequently, the British Government has introduced a new \$5 billion pound programme to aid the British Steel Corporation. The programme calls for a writing-off of old capital debts of \$3 billion and the provision of new equity finance of \$2 billion to the Corporation.¹ The Italian Government has proposed a \$6 billion plan to aid its steel sector, with at least \$2.5 billion to go to the state-owned steel company Italsider.² At least part of this subsidization will allow the Italian industry to expand, as well as to modernize its production capacity in steel.

In June 1981, the mandatory production quotas imposed by the EEC Commission were terminated and the EEC Industry Ministers reached a voluntary agreement to cut production levels in Europe and to raise prices between 15-20 percent July 1, 1981. This agreement is to continue until July 1982.

The EEC steel industry as a whole is less efficient than those of Japan and Canada, mostly because of low capacity utilization, but slightly more efficient than that of the United States. An ITC study estimated that in 1976, EEC steel producers enjoyed an overall cost advantage of some 12 percent over Canadian and U.S. steel producers.³ Much of this was lost in the late 1970's and in 1980 due to re-evaluation of European currencies against the Canadian and U.S. dollars. The trend has reversed once again, and the landed price of steel from the EEC to Canada and the U.S. is highly competitive.

The production of steel in the EEC in 1980 was estimated to be 120 million tonnes, and the capacity utilization was only 65 percent. Exports from the EEC have steadily declined over the 1978-80 period, leaving persistent excess capacity in the EEC steel industry and putting pressure on EEC producers to cut prices and expand exports. (See Table 58)

¹The Economist, January 24, 1981.

²Journal of Commerce, March 31, 1981.

³Department of Industry, Trade and Commerce, Report of the Consultative Task Force on the Canadian Primary Iron and Steel Industry (Government of Canada, Ottawa, 1978), p. 6.

FINANCIAL PERFORMANCE: EEC STEEL COMPANIES¹
1978 and 1979
 (\$ Million U.S., except as noted)

Table 57

Company	Year	Sales	Assets	Net Income (loss)	Equity	Employees (000's)	Return on Assets (%)
Thyssen, Germany	1978	9,182	7,020	61.2	1,611	129.9	0.87
	1979	13,637	9,933	87.2	1,842	155.8	0.88
Salzgitter, Germany	1978	3,214	3,619	(48.2)	386	50.1	Loss
	1979	3,869	4,607	(2.0)	531	55.7	
Klockuer-Werke, Germany	1978	1,746	1,956	(35.8)	352	28.2	Loss
	1979	2,368	2,383	(14.5)	392	29.1	
Stahlweke Rochling-Burbach, W. Germany	1978	1,275	1,538	(34.9)	269.7	25.9	Loss
	1979	1,319	1,448	(32.8)	289.7	22.0	
Estel (Netherlands)	1978	5,072	6,002	(133.5)	1,296	77.4	Loss
	1979	6,503	6,733	(86.6)	1,254	79.2	
Cockerill (Belgium)	1978	3,145	3,863	(227.6)	529	46.3	Loss
	1979	3,259	3,925	(122.4)	615	34.3	
Arbed (Luxembourg)	1978	1,193	2,390	(61.1)	625	21.6	Loss
	1979	1,549	2,564	(7.4)	664	20.7	
Hainaut-Sambre (Belgium)	1978	611	1,023	(89.9)	140	7.5	Loss
	1979	1,468	2,084	(46.2)	209	15.1	
Pechinerry Ugine Kuhlman, France	1978	6,130	7,218	58.0	1,677	96.0	0.80
	1979	7,961	8,168	233.1	1,955	91.9	2.85
Schneider, France	1978	4,705	12,754	1.0	404	109.0	0.01
	1979	6,385	14,091	2.4	389	105.0	0.02
Sacilor, France	1978	2,458	5,164	(249.1)	390	34.8	
	1979	3,764	6,362	(358.5)	247	29.9	
British Steel ² , U.K.	1978	5,673	9,118	(797.6)	2,904	197.1	
	1979	6,385	10,791	(600.8)	4,208	186.0	Loss
Italside, Italy	1978	3,066	7,387	(411.2)	1,433	52.3	
	1979	3,744	7,360	(309.7)	1,480	52.7	Loss

¹ Includes only those companies listed in Fortune's 500 Largest Industrial Corporations Outside the United States.

² Loss for British steel in 1980 was over \$3 billion, the highest ever by any company anywhere.

Source: Fortune, August 13, 1979 and August 11, 1980.

ECONOMIC PERFORMANCE OF THE EEC STEEL INDUSTRY:
CURRENT INDICATORS 1978-1980

Table 58

	(million tonnes)		
	<u>1978</u>	<u>1979</u>	<u>1980(est.)</u>
Crude Steel Production	120.3	127.0	119.8
Apparent Steel Consumption	98.6	109.6	106.1
Exports of Steel	39.6	36.9	33.7
Imports of Steel	12.1	12.6	12.2
Net Trade Balance	27.5	24.3	21.5
Capacity	183.3	184.1	185.3
Utilization Rates	65.6	69.0	64.6
Total Employment ('000)	715.0	678.3	654.6

Source: The Steel Market in 1979 and The Outlook for 1980 and
IISI, Steel: Statistical Yearbook: 1980

The short term outlook for the EEC steel industry, predicted by the OECD Steel Working Party, is as follows:

"In the EEC, real steel consumption will fall by a further 5.5% (in 1981) and apparent consumption by at least 12% as major steel using sectors such as the motor industry continue to decline in most EEC member states... Raw steel output may fall by as much as 10%, giving a capacity-use rate of only 57% against 63% last year."¹

¹Quoted in American Metal Market: Metal Bulletin, April 28, 1981.

This may have serious implications for the Ontario steel industry. The domestic supply of steel from Ontario mills is less than adequate for apparent domestic consumption. The strike at Stelco has further reduced the supply of steel from domestic sources. However, steel mills in Ontario are expanding capacity to fill the gap and to accommodate increased demand in steel due to energy projects. In the interim (ie. until late 1983), the gap can be filled by imports from the EEC. This may create problems for the production expected from new capacity which is being added now to start production in 1983 and 1984. Canadian customers who start using imported steel may become settled with their arrangements with suppliers from the EEC, and it may not be easy for Canadian steel mills to attract their business when it has capacity to meet that demand. Effective depreciation of European currencies to the tune of 30-50 percent has created a situation whereby EEC producers can compete with Canadian mills. Moreover, rapid and wide fluctuations in currencies has created a condition of uncertainty among economies highly dependent on trade like Ontario. It may be in the best interest of Ontario to conduct a study of the vulnerability of Ontario's manufacturing sector and steel industry to wide fluctuations in dollar value.

VII. CONCLUSION

By international comparisons, the steel mills located in Ontario have performed well because of high operating rates. The strength of this sector in the past was due largely to prudent management, aided by the low value of the Canadian dollar internationally. Earlier this year, the Canadian dollar increased substantially against most European currencies. This has provided a great competitive edge to the European steel producers who now can sell steel in Canada, and in other countries which are important markets for steel exports from Ontario. The export markets are becoming increasingly important to domestic steel mills, but continuing economic slowdowns and recession in most developed economies has reduced steel consumption drastically. Low demand and exceptionally high imports are preconditions to layoffs which currently are prevented by the strike at Stelco.

The rates of return in the steel industry, which play a vital role in the economy of Ontario, are low relative to those in other manufacturing activities. Internally generated funds are inadequate to provide capital accumulation needed for repairs, replacements and expansions. Individual steel mills can, undoubtedly, run into trouble raising capital from outside sources at reasonable rates.

Future activity in the steel industry relies heavily on the start-up of megaprojects in the energy field. All three steel-makers will benefit from energy megaproject sourcing both directly, and indirectly through the spillover of orders from other sectors. Settlement of the federal/provincial energy pact is likely to have a positive impact on the start-up of energy megaprojects. However, it will also increase the price of energy, which is the largest component of steel manufacturing costs. Steel mills must take a fresh approach to energy conservatoion.

The basic raw materials for steel-making, such as coal and iron ore, are largely imported from the United States. A long strike at coal mines in the United States could create critical shortages of coal. Even though critical shortages have not materialized during past coal miners' strikes, coal stockpiles

were reduced in the summer of 1981 to levels low enough to cause concern at more than one mill. In addition any other important alloying elements are imported from rather unstable regions of the world.

The relationship of steel companies with labour varies from near cordial at one firm to perpetual conflict at another. Labour productivity in the industry has remained nearly static inspite of large infusions of capital in the industry.

Government and steel industry dialogue currently is concentrated at the federal government level. The industry has no lines of communication open with the Government of Ontario, even though all major steel-makers are located in Ontario. The industry has expressed publically its desire to improve relationships with all levels of government. The next step in this direction is up to the Government of Ontario.

APPENDIX A

GLOSSARY

Alloy steel

Steel in which the contents of alloying elements are added beyond certain limits to develop specific properties, eg. high strength low alloy steel (HSLA).

Annealing

A controlled heating and cooling to obtain desired physical properties, e.g. softening or improved ductility in metals.

Bars

A finished steel product rolled from billets, usually in flat, square, round or hexagonal shape.

Basic Oxygen Process

A pneumatic steelmaking process in which commercially pure oxygen is introduced by means of a lance or pipe into a vessel holding molten iron. In the resulting chemical reaction, the oxygen combines with unwanted elements in the molten metal and leave as gases or enter the slag or scum of impurities on the surface of the molten metal.

Beam

A bar or straight girder used to support a span between two support props or walls.

Beneficiation

Process which improves the characteristics of iron-bearing materials prior to use. Its major forms are sintering and pelletizing.

Billet

A piece of semifinished iron or steel that is nearly square in section and longer than a bloom. Bars and pipes are made from billets.

Blast Furnace

A tall cylindrical structure in which iron ore is converted into molten iron, (hot metal, pig iron). In a blast furnace, great quantities of heated air are blown up through a full furnace of descending ore, coke, and lime stone as flux.

Bloom

A semifinished product, large and mostly square in cross section, produced from an ingot. They are shaped into girders, beams (I, H, T and others) and other structural shapes.

Cast Iron

Generic term for the family of high carbon silicon-iron casting alloys including gray iron, ductile iron, malleable iron, and white iron.

Carbon Steel

Steel in which the mechanical properties of the metal are primarily dictated by the carbon content, is the highest tonnage product.

Coil

A finished steel product such as a sheet or strip which has been wound or coiled after emerging from a rolling mill.

Coke

The fundamental fuel obtained from coal; is used in blast furnaces to make iron. Approximately 1,000 pounds of coke are consumed for every net ton of pig iron produced.

Cold Rolling

The passing of sheet or strip that has been hot rolled and pickled through cold rollers. Makes a product that is thinner, smoother and with a higher strength-to-weight ratio than can be made by hot rolling.

Continuous Casting

A process for the continuous forming of molten steel directly into the form of slabs, blooms, or billets, thus eliminating the ingot stage and the necessity of primary hot-rolling operations.

Direct Reduction

Any process for reducing iron ore or oxides that bypasses the intermediate step of making hot metal or cold pig on the way to producing iron and steel.

Dumping

Consists of several methods through which a higher cost producer can displace lower cost competitors.

Electric Arc Furnace

An enclosed vessel heated by an electric arc and the resistance of the steel bath itself. In this process, oxygen is not fed to support combustion, therefore comparatively less alloying elements are needed to make alloys.

Fabrication

The cutting, punching, stamping, or otherwise forming trimmed sheet metal into shapes for use in end-products.

Ferroalloy

An iron alloy made to be used in the production of steel. Some alloying elements can be made cheaper as an alloy of iron than as the pure metals themselves.

Flux

A substance used to prevent excessive oxidation and to promote the fusion of iron, which involves the removal of impurities during iron and steelmaking, (e.g. limestone, dolomite, and fluorspar).

Galvanizing

Immersion of clean steel or iron in a bath of molten zinc to form a protective coating.

Galvalume

A new process in which clean steel sheet is dipped into a bath of molten aluminum and zinc to provide better protective coating.

Greenfield Site

A wholly new plant from the ground up, including all auxiliary equipment.

High strength low alloy steel

Steel with chemical composition specially developed to impart better mechanical properties and greater resistance to atmospheric corrosion than is obtainable from conventional carbon structural steel.

Hot rolling

The passing of hot steel through pairs of steel rollers to form rolled steel sections such as strip, plate, structural shapes, etc.

Ingot Molds

A mold for casting steel which may hold steel product to be rolled from a half ton up to more than 250 tons of steel.

Integrated Steel Mill

A mill which converts iron ore into a semifinished or finished steel product. Traditionally, this required coke ovens, blast and steelmaking furnaces, and rolling mills. A growing number of integrated mills use the direct reduction process to produce sponge iron without coke ovens or blast furnaces, and generally melt this together with scrap iron in an electric-arc furnace.

Metallurgical Coal

A type of coal suitable to the production of metallurgical coke.

Mini-Mill

A small non-integrated or semi-integrated steel plant, generally based on electric furnace steelmaking and continuous casting, that produces a limited range of products for sale in a limited geographic market.

Open Hearth Process

A process for making steel from molten iron and scrap. It is named for the hearth or floor of the furnace which is shaped like an elongated saucer. Heat is passed over the surface of the molten metal to maintain its temperature.

Pellets

A beneficiated form of iron ore shaped like small balls.

Pickling

Removal of oxides and scale from steel by chemical baths to achieve a clean surface for further processing (i.e. painting, coating, and enameling).

Pig Iron

High carbon iron made by reduction of iron ore in the blast furnace.

Raw Steel

Steel in the first solid state after melting, suitable for further processing or sale, which includes ingots, steel castings, and strand or pressure-cast blooms, billets, slabs, or other product forms. Synonymous to crude steel.

Rolling Mill

Any one of the mills in which steel is squeezed or pressed into shapes under great pressure (i.e. slabbing mill, blooming mill, roughing mill).

Scrap Iron or Steel

Ferrous metallic material that is the waste of industrial production objects that have been discarded. There are basically three kinds of scrap:

- Home scrap - iron and steel left over and trimmed off within a steel plant or foundaries. Also called revert scrap or runaround scrap.
- Prompt industrial scrap - steel returned to the steelmaker by a customer after he has shaped his product.
- Obsolete scrap - steel that was made into products, used, and then discarded. Also called old scrap or dormant scrap.

Sintering

A process which combines ores too fine for efficient blast-furnace use with flux stone. The mixture is heated to form clumps, which allow better draft in the blast furnace. In addition, the flux incorporated as a binder is used in the iron-making process.

Slab

A wide semifinished product made from an ingot. Sheets, strip, plates and other flat rolled steel products are made from slabs.

Slag

Impurities which rise to the surface of molten steel and combine with the fluxes. It has by-product uses in metallurgy, construction, and agriculture.

Specialty Steel

A steel containing alloys which provide special properties such as resistance to corrosion or to heavy load.

Stainless Steel

Iron-base alloys containing enough chromium to confer a superior corrosion resistance.

Steel

An iron-base alloy malleable in some temperature range as initially cast, containing manganese, carbon and, in many cases, other alloying elements.

Steel Plates

Flat rolled products mostly rolled from slabs.

Steel Service Center

Warehouser and distributor of steel products which may also perform further processing such as slitting or shearing.

Ton, Tonne

- ton, also 'net ton' or 'short ton' of 2,000 pounds = .9072 metric tons.
- 'long ton' or 'gross ton' = 2,240 pounds = 1,016.04 kg. = 1.0160 metric tons.
- tonne or metric ton = 1,000 kg. = 2,204.6 pounds = 1.1023 short tons.

Tool Steels

Either carbon or alloy steel capable of being hardened and tempered to meet special requirements.

Trigger Price Mechanism

Established in 1978 to facilitate enforcement of U.S. antidumping laws.



Iron and Steel Mills: Canada 1981

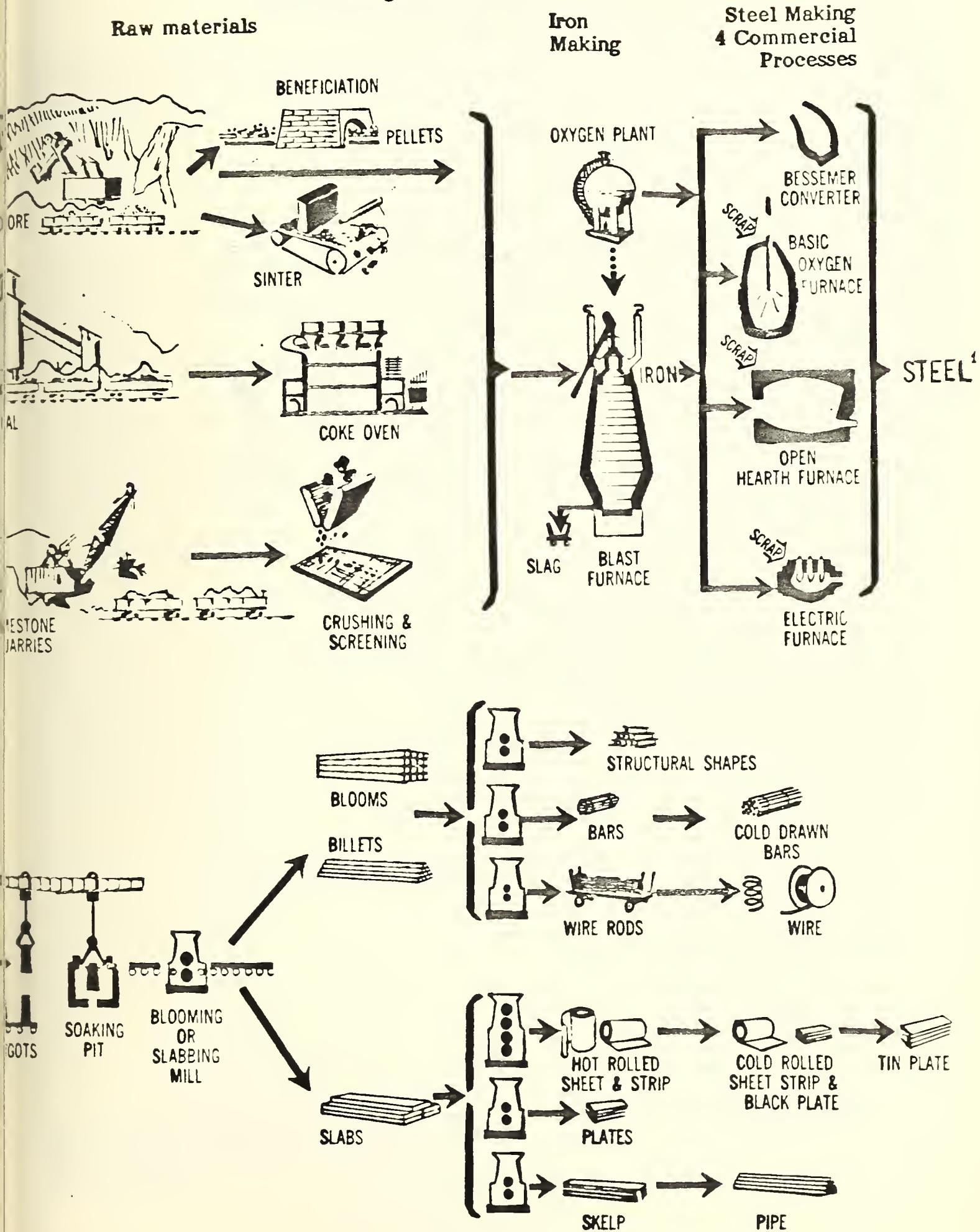
- Integrated Iron and Steel Operations
 - Sydney Steel Corp., Sydney, N.S.
 - Algoma Steel, Sault Ste. Marie, Ont.
 - Dofasco Inc., Hamilton, Ont.
 - Stelco Inc., Hamilton, Ont.

- ▲ Electric Furnace Operations
 - Enheat Ltd., Amherst, N.S.
 - Atlas Steel, Tracy, Que.
 - Canadian Steel, Montreal, Que.
 - Colt Industries, Sorel, Que.
 - Sidbec-Dosco, Que.
 - Stelco Inc., Contrecoeur, Que.
 - Atlas Steels, Welland, Ont.
 - Burlington Steel, Hamilton, Ont.
 - Ivaco Industries, Whitby, Ont.
 - Manitoba Rolling, Man., Sask.
 - IPSCO, Regina, Sask.
 - Western Canada Steel, Alta., B.C.

Source: Statistics Canada, Cat. 41-001, Primary Iron and Steel, February, 1981.

APPENDIX C

Steel Making from Raw Materials

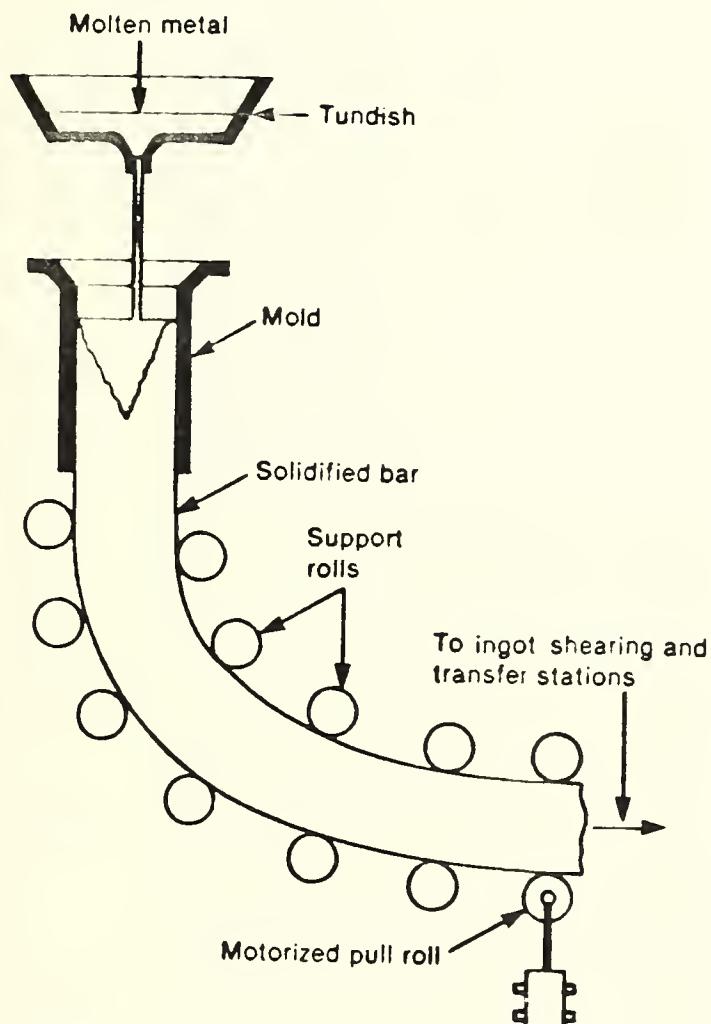


¹Molten steel may be poured in continuous caster.

APPENDIX D

CONTINUOUS CASTING OF STEEL

Molten Steel from any of the four types of furnaces (identified on the previous page) is poured in the tundish by a ladle. Turnish holds enough molten steel to allow changing of ladles.



SOURCE *Technology Assessment and Forecast, Ninth Report, U.S. Department of Commerce, March 1979*

At Stelco's Lake Erie Plant, the continuous caster makes a continuous slab of steel 6 feet wide and 10" thick. It is usually cut in 32' lengths for transportation.

A hot connection to speed U. S. steelmaking

After years of resistance, the U. S. steel industry is taking steps to modernize its manufacturing plant. It is adding up to million tons of continuous-casting capacity in the next couple of years.

Continuous casting eliminates such energy-intensive and wasteful processes as pouring hot metal into ingot, stripping the cold ingot from its container, heating it in soaking pits, and then rolling it in massive mills that are costly to maintain. In continuous casting, hot metal is poured directly into a mold and then pulled through a curved, roller-driven, water-cooled track. Within four minutes a continuous strand of semifinished steel emerges, ready to be cut for final processing.

According to figures soon to be released by the Institute for Iron & Steel Studies, an independent industry research group, U. S. steelmakers will increase their continuous casting output to 2 million tons within two years. That will be about 25% of their steelmaking capacity, up from only 18% in 1980.

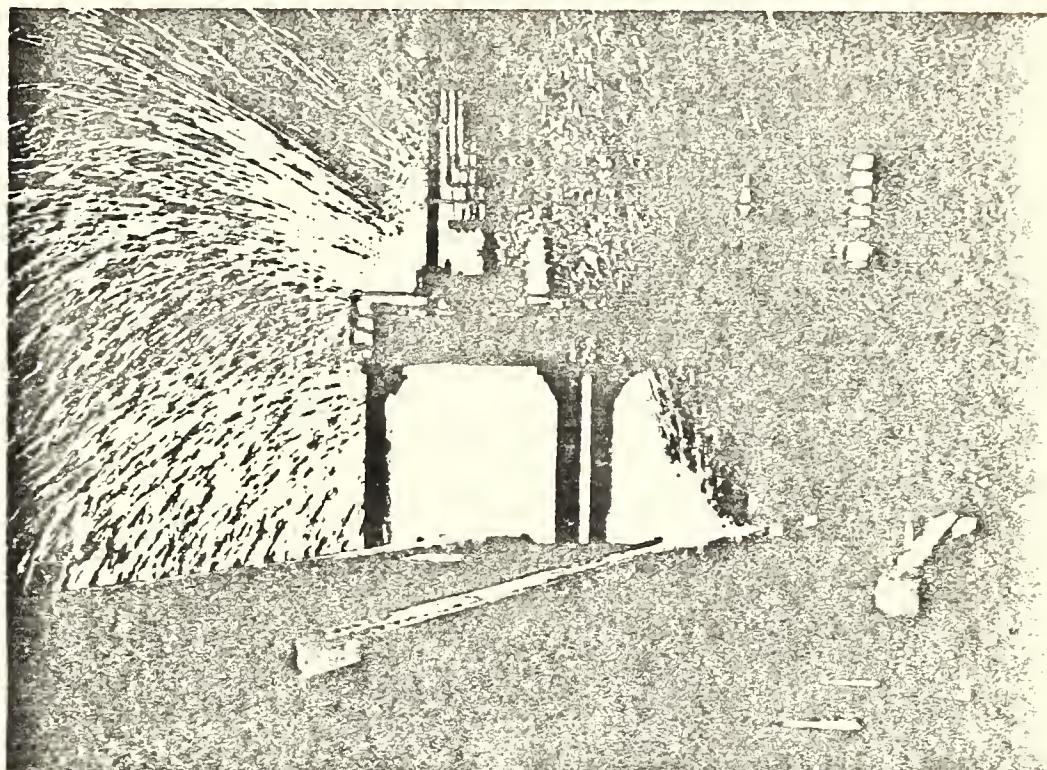
Even then, the U. S. will still lag behind the Europeans, with 43% continuous-cast steel, and the Japanese, with 5%. But it will be a significant start toward the U. S. industry's expressed \$8 goal of being able to cast continuously 68 million tons of steel, or 45% of total production.

"One way or another," admits one engineer at U. S. Steel Corp., "we have

U. S. mills finally follow Europe and Japan in the move to modernization

to go to continuous casting in the next 10 years or we will be in serious trouble." F. Kenneth Iverson, president of Nucor Corp., one of the nation's small, all-continuously-cast, specialty "minimill" steelmakers, is even more emphatic. "If U. S. steel company doesn't have continuous-cast production in the next five to six years, it won't be in the steel business," he predicts.

With only 1.5 million tons of steelmaking capacity at three small plants, Iverson does not have the huge conversion cost problems that David M. Roderick, chairman of U. S. Steel, has. But Roderick, whose steel operations in 1980 earned only \$58 million on \$8 billion in sales compared with Nucor's \$76 million earnings on \$482 million, agrees that "if we are to be competitive, we must accelerate our use of continuous-cast technology." Late last year, Roderick announced that his company will add more than 2



A new caster at Atlantic Steel: A strand of semifinished metal in four minutes.

million tons a year of continuous-casting capability by expanding a caster now in place in Gary, Ind., and by building new units at Lorain, Ohio, and Pittsburgh.

U. S. leader. U. S. Steel is not alone. In February, National Steel Corp. fired up its third continuous caster, a \$60 million unit at Granite City, Ill., which puts National far ahead of its big domestic steel competitors by allowing it to produce 55% of its steel continuously. Also this year, Atlantic Steel Co., a small U. S. steel manufacturer, fired up a six-strand continuous caster at its Atlanta works, converting its production of wire rod, small shapes, and plate steel to 100% continuous cast. Other new units that will come on-stream soon include a \$90-million, 700,000-ton-per-year billet caster owned by Armco Inc. at Ashland, Ky., two casters put in by Northwestern Steel & Wire Co. in Sterling, Ill., and a 600,000-ton-per-year caster that will double capacity for Chaparral Steel Co. in Midlothian, Tex. A large, so-called rounds caster also will be completed at CF&I Steel Corp.'s Pueblo (Colo.) plant in 1983.

Start of a wave. Caster proponents believe that this is just the start of a wave of such construction or conversions. "Fifteen major U. S. plants are now negotiating or considering placing orders for continuous casters," says Herbert Lemper, president of the Continuous Casting Div. of Mesta Machine Co., the U. S. licensee for construction of large slab

casters that are designed by Germany's Mannesmann Demag Corp. "And we believe," says Lemper, "that these 15 are only the tip of the iceberg."

If so, it is good news not only for Demag but also for Concast Inc.—both holders of continuous casting patents. It should also mean big business for companies such as Koppers Co., Danieli of America Inc., and Rokop Corp., which are aggressively competing for part of the continuous-casting business. Joseph M. Farina, sales director of Concast, agrees that the traditionally slow-to-change U. S. steel industry is finally moving to improve the economics of its production facilities. "This is the year our company has been awaiting for a long time," he says.

Gains. The cost savings in continuous casting are immense. By avoiding the reheating of steel ingot, it saves at least 10%, or 3 million Btus, of energy per ton of steel produced. This translates into a production saving of about \$15 per ton. More important, the yield of finished steel from the same amount of hot metal also increases at least 10%. In traditional steelmaking processes, the front and back ends of each ingot have to be cut off and scrapped after they are rolled into rough form. With continuous casting, an entire furnace full of metal is processed, and slab after slab can be cut off a continuous strand moving at a speed of about 4 ft. a minute. Moreover, the quality of the steel that continuous casting

duces is better because its chemical elements are more evenly dispersed than when steel is poured into ingots. Between the yield improvement and energy savings, steelmen conservatively estimate total savings at \$25 to \$30 for a ton of steel, which currently costs in the U.S. for about \$400. They see that a mill's typical savings will be for a caster within its first three years of operation.

With all that going for continuous casting, "it really disturbs me," says Charles A. Bradford, a steel analyst for Merrill Lynch, Pierce, Fenner, & Smith, "that some companies—Bethlehem Steel Corp. and Republic [Steel Corp.] especially—aren't doing more to convert." Bethlehem's only caster, at Burns Harbor, Ind., the nation's newest steel mill, is a resounding success. But it can process only 28% of the steel produced at Burns Harbor. And the company has immediate plans to expand further and is doing only preliminary engineering for an additional caster to be built at its relatively small rail and pipe mill near Harrisburg, Pa.

Jones & Laughlin Steel Corp., which is trading one small caster now at Aliquippa, Pa., is completing engineering for a large slab caster that it may decide

to build by midyear. But Republic has temporarily shelved plans for a big caster at one of its steel plants in Ohio. And Inland Steel Co., which continuously casts 23% of its steel output, reports no new plans to expand now.

The cost. To meet its goal of producing 45% of its output by continuous casting by 1988, the U.S. industry will have to

Continuous casting ends slow cold-ingot processing, makes metal at less cost

spend about \$4 billion, or \$500 million per year. That is about a third of its average annual overall earnings in recent years. But in return, it can expect to save at least \$1.7 billion, and possibly closer to \$3 billion, in operating costs annually. This will improve its position in world markets—and especially in competition with Japan's steel industry.

U.S. steelmen believe that Japanese steelmakers will soon be making 80% of their steel continuously, however. Japanese steelmen suggest their objective is closer to 90%. Says Dr. Hiroshi Ooi, general manager of the Technical Development Dept. at Kawasaki Steel Corp.: "Our only practical limitation is our product mix." Only two steel product

lines in Japan—thick plate for heavy structural and "soft steel" used typically for inexpensive fabrications—do not lend themselves to good-quality cast metal, according to Ooi. In Japan that is only 10% of total steel production.

Remaining roadblocks. In the U.S. the short-term practical limit to how far continuous casting can be pushed is considerably lower. For instance, 12% of U.S.-manufactured steel is still made in slow, open hearth furnaces that cannot keep up with ever-thirsty casters. Moreover, most U.S. steel mills, although smaller than Japanese mills, make a broader range of products requiring a wider range of intermediate shapes. Complete dependence on a caster can cut product flexibility.

But most important, the U.S. has trailed in continuous casting, says Concast's Farina, because, unlike the Japanese and German industries, the U.S. steel industry was not rebuilt after World War II. "Overseas," he says, "the question was only, 'Which new process do I buy?' Here, the question of corporate executives has been, 'Do I replace?'"

A few years ago, the automatic answer of most U.S. steel executives would have been "No." But now they are beginning to answer "Yes." ■

Source: Business Week: April 27, 1981

APPENDIX E
CORPORATE FINANCIAL FLOW:
ALGOMA, DOFASCO AND STELCO

The cash flows, profits, depreciation and so forth, as reported by the major steel companies (and most other major companies) are based on traditional cost accounting principles. This methodology has various weaknesses because the system assumes that the dollar is a constant unit of measure. Thus the information on the profitability of a firm based on this information is not reliable. This appendix is an attempt to focus attention on a very narrow aspect of the overall problems in internal accounting caused by inflation.

In traditional cost accounting, depreciation is based on historic cost base of the machinery and equipment. This creates problems. For all firms which are large users of capital, including steel companies, the steel industry needs large sums of capital not only to repair and replace existing capital goods, but also to expand. Algoma, for example, is in the process of relining one of its blast furnaces at an estimated cost of \$70 million. The cost of the blast furnace in 1975 was only \$52 million. Thus the cost of relining the furnace is higher than the initial cost of acquiring and installing it only six years ago. Even if the depreciation account has added \$52 million to the working capital for the replacement of this blast furnace, this fund is not even adequate to reline it. Moreover, when equipment is replaced, it will not be replaced with an identical item, but with any updated version of the equipment, which is more expensive not only because of inflation, but also because of technological changes. The profits reported in the interim years will be overstated, whereas the funds required for replacement of worn equipment will be inadequate.

Funds required for expansion projects create additional problems. The following methodology was developed to reexamine the cash flow of the big three steel-makers for the past ten years in a somewhat unconventional method, to arrive at cumulative net internally generated cash flows of the big three individually. The results are reported in tabular form for each company individually. Page one of each table presents the

general cash flows provided by the company, such as working capital from operations, and cash flows from operations.

On the second page of each table, internally generated funds are calculated on the assumption that reported depreciation is inadequate and should be taken out (the accounting profession sees the role of depreciation differently). The remainder is termed distributive cash flows and after dividends are taken out the remainder is called discretionary cash flows - for the lack of a better term. The cumulative total of this item for 10 years (1971 to 1980) may be considered to be the funds available to the company for capital replacement and for expansion purposes.

Between 1971 and 1980, Algoma's cumulative total of discretionary cash flows was only \$107.4 million dollars. Comparable totals for Dofasco and Stelco are \$310.7 million and \$217 million respectively. Stelco's cumulative discretionary cash flows at Dec. 31, 1980 were \$216.9 million, some \$12.1 million below the 1975 total. Overall, the big three created cumulative cash flows of only \$635 million in ten years. The cumulative discretionary cash flows for the 1975 to 1980 period for the big three were only \$278 million.

Proceeds from the sales of fixed assets and investments are not included in internal sources in this methodology because these assets are sold forever and are not recurring. Moreover, the amount is so small that it does not change the idea being developed by this analysis. (At least one accounting book treats such funds as funds from other sources rather than the internally generated funds). The big three thus have been relying heavily on funds from outside - sources such as the issue of preference shares, common shares and debentures.

Sources and applications of funds are examined on the third page of each table. For each company it shows net changes in financial resources and the cumulative total for the ten year period, which is negative for all the firms.

As mentioned earlier, the methodology presented in this section is somewhat controversial, but still it aids in arriving at a few important conclusions:

- . Depreciation by traditional accounting methods provided inadequate capital formation for the replacement of capital goods, and profits for the period are overstated. The industry would be well-advised to examine "current cost accounting whose fundamental premise is that profits should only be calculated after a company makes provisions for the cost of replacing plant and inventory at today's prices."¹
- . The big steel mills have not been generating adequate internal funds for capital expansion programs. Therefore, reliance on outside sources is at unprecedented high levels.

¹ Robert Fisher, "How Barbecon Inc. profits from current cost accounting, Canadian Business, July 1981; p. 25

ALGOMA STEEL CORPORATION LTD.
CORPORATE FINANCIAL FLOW, 1971-1980
 (000's of dollars)

Table E1
 Page 1 of 3

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Total Working Capital From Operations¹	51,802	32,652	57,787	89,443	49,616	19,182	41,247	109,504	180,656	181,447
Net Change in:										
Current Assets ²										
Accounts Receivable	(2,167)	(7,186)	216	(17,020)	(15,892)	287	(14,626)	(39,561)	(1,600)	(15,491)
Inventories	(5,664)	(2,491)	(1,089)	(17,911)	(37,158)	(43,878)	(18,949)	(24,981)	(59,445)	(38,042)
Prepaid Expenses	(367)	(367)	(418)	(454)	(928)	(880)	(340)	(572)	(219)	198
Other	381									
Total Additions (or subtractions)	(7,817)	(10,044)	(1,291)	(35,385)	(53,978)	(44,471)	(33,915)	(63,970)	(61,264)	(53,335)
Net Change in:										
Current Liabilities ³										
Accounts Payable	(408)	10,886	5,716	28,777	(6,091)	8,860	4,452	26,690	19,743	10,851
Profit Sharing	123	331	672	838	1,821	205	33	214		2,515
Taxes Payable										
Dividends Payable										
Current Debt Requirements										
Other (notes payable)	(20,229)	17,963	(17,963)	679	678	1,729	2,808	10,479	(10,923)	(5,450)
Other (notes payable)				5,268	36,043	21,189	(35,778)	(10,592)	(16,130)	
Total Additions (or subtractions)	29,180		35,561	33,502	33,062			53,389		13,366
Cash Flow From Operations	(20,514)		(10,896)				(20,814)		(1,670)	
	23,471	51,788	45,600	89,619	29,140	7,773	(13,412)	50,923	117,722	141,478

¹ Working capital from operations (WCO) = net income from operations plus items which contribute to working capital, such as depreciation and deferred income taxes. (This calculation is also done and reported in most annual reports).

² If current assets increase from the previous year, the net change is subtracted from working capital. If current assets decrease from the previous year, the net change is added to working capital.

³ If current liabilities increase from the previous year, the net change is added to working capital. If current liabilities decrease from the previous year, the net change is subtracted from working capital.

NAME OF FIRM: ALGOMA

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Internal Sources of Funds										
Cash Flow from Operations	23,471	51,788	45,600	89,619	29,140	7,773	(13,482)	50,923	117,722	141,478
Less: Reported Depreciation	18,890	20,620	23,477	26,078	29,331	33,036	33,631	35,660	39,889	47,335
Distributive Cash Flow	4,581	31,168	22,123	63,541	(191)	(25,263)	(47,113)	15,263	77,833	94,143
Less: Dividends	5,800	5,798	7,252	15,737	16,338	16,405	9,118	9,466	18,832	23,908
Discretionary Cash Flow ⁴	(1,219)	25,370	14,871	47,804	(16,529)	(41,668)	(56,231)	5,797	59,001	70,235
Cumulative Total⁵	1,219	24,151	39,022	86,826	70,297	28,629	(27,602)	(21,805)	37,196	17,431
Other Sources of Funds										
Proceeds from Sale of:										
Fixed Assets										
Investments	2,492									
Total Proceeds of Sale	2,492									
Proceed from Issue of:										
Preference Shares										
Common Shares										
Debentures										
Other Long Term Debt										
Total Issues	33,257	1,200	30,724	64,390	95,152	10,686	3,500	107,213	35,000	
Other (Net)	1,031	203	31,328	64,914	95,152	68,517	83,223	3,500	107,508	111,804
Total External Sources	36,780	1,403	31,423	4,0291	9242	86	149	3,597	720	2,245
Total Sources of Funds⁶	35,561	26,773	46,294	68,943	102,085	68,827	84,358	8,140	108,626	114,049
Less: Reduction of Long-Term Debt	4,043	3,034	3,838	116,747	85,556	27,159	28,127	13,937	167,627	184,284
Less: Share Repurchase										
Total Funds (net)	31,508	23,739	42,456	114,547	82,165	18,967	10,840	7,837	57,263	39,891
Net Cumulative Grand Total	31,508	55,247	97,703	212,250	294,415	313,382	324,222	332,059	442,235	583,345

⁴ Also called Internally generated funds.

⁵ Cumulative totals of Internally generated funds, starting in 1971.

⁶ Discretionary cash flow plus funds from external sources.

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Net Sources of Funds										
Discretionary Cash Flow	(1,219)	25,370	14,871	47,804	(16,529)	(41,668)	(56,231)	5,797	59,001	70,235
Total Sale Proceeds	2,492				6,009	224	986	1,043	398	
Total Issue Proceeds	33,257	1,200	31,328	64,914	95,152	68,517	83,223	3,500	107,508	111,804
Other (Net)	1,031	203	95	4,029 ⁷	924 ⁸	86	149	3,597	720	2,245
Less: Reduction of Debt	(4,053)	3,034	(3,838)	(2,200)	(3,391)	(8,192)	(17,287)	(6,100)	(57,451)	(43,174)
Total Funds (net)	31,508	23,739	42,456	114,547	82,165	18,967	10,840	7,837	110,176	141,110

Application of Funds

Capital Expenditures for:

Plant and Equipment	50,840	51,462	119,033	85,911	33,523	15,096	24,253	65,424	82,374	
Mine Development	1,165	16,024	18,605	18,612	17,033	14,500	14,985	23,844	24,820	
Total Capital Expenditures	52,005	67,486	137,638	104,523	50,556	29,596	39,238	89,268	107,194	
Long Term Investments	3,276	1,718	9,006	6,035	1,910 ⁷	5,674 ⁸	9,127	44,940		
Other Uses								1,098	875	
Total Uses of Funds	40,186	55,281	69,204	146,644	110,558	52,466	35,270	48,365	135,306	108,069

Increase (Decrease) in

Financial Resources	(8,678)	(31,542)	(26,748)	(32,097)	(28,393)	(33,499)	(24,430)	(40,528)	(25,130)	33,041
Cumulative Total	(8,678)	(40,220)	(66,968)	(99,065)	(127,458)	(160,957)	(185,387)	(225,915)	(251,045)	(218,004)

7 Includes federal grant of \$4,160,000

8 Includes federal grant of \$640,000

Note: Where conflicts arose between reported figures in annual report of a particular year and re-stated figures in the next year's annual report, the latest figures were taken.

Source: Algoma Steel, Annual Reports and Prospectus.

DOFASCO LIMITED
CORPORATE FINANCIAL FLOW, 1971-1980
 (000's of dollars)

Table E2
 page 1 of 3

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Total Working Capital From Operations	66,233	77,445	94,811	117,586	112,090	126,507	132,144	180,198	237,896	207,093
Net Change in:										
Current Assets ²										
Accounts Receivable	(1,279)	(20,041)	4,927	(14,870)	(18,215)	(8,594)	(4,607)	(51,965)	(14,597)	(34,992)
Inventories	(17,858)	(6,264)	(8,861)	(22,852)	(107,109)	16,747	(54,411)	(46,753)	(94,942)	(38,876)
Prepaid Expenses	1,614	2,380		(748)	(3,318)	4,066				
Other	—	—	—	—	—	—	—	—	—	—
Total Additions (or subtractions)	(17,523)	(23,925)	(3,934)	(38,470)	(128,642)	12,219	(59,018)	(98,718)	(109,539)	(38,868)
Net Change in:										
Current Liabilities ³										
Accounts Payable	1,261	(5,243)	19,969	27,823	13,439	(1,763)	31,070	16,381	23,051	5,868
Profit Sharing	(194)	1,345	2,009	1,315	(3,662)	1,216	(1,123)	6,660	6,290	(4,774)
Taxes Payable	410	11,163	(1,102)	(6,948)	(759)	4,935	(2,896)	1,424	39,191	(18,129)
Dividends Payable	7	5	413	1,734	(37)	423	2,220	415	1,747	3,246
Current Debt Requirements	(304)	170	7,789	(7,915)		1,959	(120)	94		539
Other (notes payable)	—	—	—	—	—	—	—	—	—	—
Total Additions (or subtractions)	1,180	7,440	29,078	16,009	8,981	4,811	31,230	24,760	70,373	(13,250)
Cash Flow From Operations	49,890	60,960	119,955	95,125	(7,571)	143,537	104,356	106,240	198,730	154,975

¹ Working capital from operations (WCO) = net income from operations plus items which contribute to working capital, such as depreciation and deferred income taxes. (This calculation is also done and reported in most annual reports).

² If current assets increase from the previous year, the net change is subtracted from working capital. If current assets decrease from the previous year, the net change is added to working capital.

³ If current liabilities increase from the previous year, the net change is added to working capital. If current liabilities decrease from the previous year, the net change is subtracted from working capital.

NAME OF FIRM: DOPASCO

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Internal Sources of Funds										
Cash Flow from Operations	49,890	60,960	119,955	95,125	(7,571)	143,537	104,356	106,240	198,730	154,975
Less: Reported Depreciation	28,764	330,077	35,155	35,119	38,064	42,108	47,063	53,370	64,876	65,634
Distributive Cash Flow	21,126	27,883	84,800	60,006	(45,635)	101,421	57,293	52,870	133,854	89,341
Less: Dividends	15,039	15,066	16,277	20,825	23,656	24,084	29,829	34,895	41,048	51,531
Discretionary Cash Flow ⁴	6,087	12,817	68,523	39,181	(69,291)	77,345	27,464	17,975	92,806	37,810
Cumulative Total⁵	6,087	18,904	87,427	126,608	57,317	134,662	162,126	180,101	272,907	310,717
Other Sources of Funds										
Proceeds from Sale of:										
Fixed Assets										
Investments										
Total Proceeds of Sale										
Proceed from Issue of:										
Preference Shares										
Common Shares	908	1,099	2,475	180	59,250	59,100	58,800	73,500	149,427	149,427
Debentures	49,300									
Other Long Term Debt	27,000									
Total Issues	77,208	1,099	2,475	49,430	81,257	22,157	13,009	2,612	744	744
Other (Net)	102			398						
Total External Sources	77,310	1,099	3,057	49,512	81,419	71,734	228,025	1,371	2,511	120,905
Total Sources of Funds⁶	83,397	13,916	71,580	88,693	12,128	149,079	255,489	19,346	95,317	158,715
Less: Reduction of Long-Term Debt	26,825	17,742	33,204	4,401	1,258	26,207	6,205	17,637	22,370	7,781
Less: Share Repurchase	280	483	401	255	57	231	232	285	364	166
Total Funds (net)	56,292	(4,309)	37,975	84,037	10,813	122,641	249,052	1,424	72,583	150,762
Net Cumulative Grand Total	56,292	51,983	89,958	173,995	184,808	307,449	556,501	557,925	630,508	781,270

⁴ Also called Internally generated funds.⁵ Cumulative totals of Internally generated funds, starting in 1971.⁶ Discretionary cash flow plus funds from external sources.

NAME OF FIRM:	DOFASCO	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Net Sources of Funds											
Discretionary Cash Flow	6,087	12,817	68,523	39,181	(69,291)	77,345	27,464	17,975	92,806	37,810	
Total Sale Proceeds			184	82	162	529	2,486	627	718	842	
Total Issue Proceeds	77,208	1,099	2,475	49,430	81,257	71,927	225,539	744	1,793	120,063	
Other (Net)	102		398			(722)					
Less: Reduction of Debt	(27,105)	(18,225)	(33,605)	4,656	(1,315)	(26,438)	(6,437)	(17,922)	(22,734)	(7,953)	
Total Funds (net)	56,292	(4,309)	37,975	84,037	10,813	122,641	249,052	1,424	72,583	150,762	
Application of Funds											
Capital Expenditures for:											
Plant and Equipment	52,029	28,907	37,566	84,837	100,234	85,749	152,168	128,205	61,257	176,848	
Mine Development	32,590	3,043	3,360	3,160	16,555	27,647	7,906	5,920	10,732	8,867	
Total Capital Expenditures	84,619	31,950	40,926	87,997	116,789	113,396	160,074	134,125	71,989	185,715	
Long Term Investments	35	5,742	2,742								
Other Uses		137		821	987						
Total Uses of Funds	84,654	37,829	43,668	88,818	117,776	113,396	160,074	134,125	71,989	185,715	
Increase (Decrease) in											
Financial Resources	(28,362)	(42,138)	(5,693)	4,781	(106,963)	9,245	88,978	(132,701)	594	(34,958)	
Cumulative Total	<u>28,362</u>	<u>(70,500)</u>	<u>(76,193)</u>	<u>80,974</u>	<u>187,937</u>	<u>178,692</u>	<u>(89,714)</u>	<u>(222,415)</u>	<u>(221,821)</u>	<u>(256,774)</u>	

Source: Dofasco Ltd., Annual Reports and Prospectus.

STELCO LIMITED
CORPORATE CASH FLOW, 1971-1980
 (000's of dollars)

Table E3
page 1 of 3

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Total Working Capital From Operations¹	<u>112,998</u>	<u>117,141</u>	<u>167,664</u>	<u>194,815</u>	<u>159,153</u>	<u>150,158</u>	<u>141,905</u>	<u>192,865</u>	<u>264,110</u>	<u>230,491</u>
Net Change in:										
Current Assets ²										
Accounts Receivable	(2,547)	(16,062)	5,476	(17,901)	(12,798)	(12,339)	(29,294)	(45,773)	(45,520)	(45,030)
Inventories	(5,757)	(24,218)	5,469	(60,862)	(125,176)	(29,850)	(40,539)	(20,475)	(144,979)	(87,767)
Prepaid Expenses	(480)	(731)	152	(135)	(849)	301	(939)	(92)	738	2,228
Other	—	—	—	—	—	—	—	—	—	—
Total Additions (or subtractions)	<u>(8,784)</u>	<u>(41,011)</u>	<u>11,097</u>	<u>78,898)</u>	<u>(138,823)</u>	<u>(41,888)</u>	<u>(70,772)</u>	<u>(66,340)</u>	<u>(189,761)</u>	<u>(130,569)</u>
Net Change in:										
Current Liabilities ³										
Accounts Payable	8,576	(2,640)	14,188	40,150	32,103	996	18,895	42,503	7,971	30,678
Profit Sharing	(15,750)	(1,278)	26,401	(12,429)	(164)	3,209	(3,289)	19,256	(1,588)	(4,770)
Taxes Payable	1,220	96	1,239	2,406	13	(34)	3,109	1,383	4,024	5,871
Dividends Payable	(1,587)	(15)	(1)	(51)	1,341	50	1	225	2,705	8,646
Current Debt Requirements	—	20,000	(20,000)	—	40,039	(40,039)	—	—	—	—
Total Additions (or subtractions)	<u>(7,541)</u>	<u>16,163</u>	<u>21,827</u>	<u>30,076</u>	<u>73,332</u>	<u>(35,818)</u>	<u>18,716</u>	<u>63,367</u>	<u>13,112</u>	<u>40,425</u>
Cash Flow From Operations	<u>96,673</u>	<u>92,293</u>	<u>200,588</u>	<u>145,993</u>	<u>93,662</u>	<u>72,452</u>	<u>89,849</u>	<u>189,892</u>	<u>87,461</u>	<u>140,347</u>

¹ Working capital from operations (WCO) = net income from operations plus items which contribute to working capital, such as depreciation and deferred income taxes. (This calculation is also done and reported in most annual reports).

² If current assets increase from the previous year, the net change is subtracted from working capital. If current assets decrease from the previous year, the net change is added to working capital.

³ If current liabilities increase from the previous year, the net change is added to working capital. If current liabilities decrease from the previous year, the net change is subtracted from working capital.

NAME OF FIRM:	STELCO	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Internal Sources of Funds											
Cash Flow from Operations	96,673	92,293	200,588	145,993	93,662	72,452	89,849	189,892	87,461	140,347	
Less: Reported Depreciation	37,100	39,700	46,700	52,100	51,381	54,868	55,126	56,723	60,496	70,315	
Distributive Cash Flow	59,573	52,593	153,888	93,893	42,281	17,584	34,723	133,169	26,965	70,032	
Less: Dividends	30,430	30,763	32,024	38,209	41,960	41,991	50,205	54,762	64,852	82,778	
Discretionary Cash Flow ⁴	29,143	21,830	121,864	55,684	321	(24,407)	(15,482)	78,407	(37,887)	(12,746)	
Cumulative Total⁵	29,143	50,973	172,837	228,701	229,022	204,615	189,133	267,540	229,653	216,907	
Other Sources of Funds											
Proceeds from Sale of: Fixed Assets											
Investments											
Total Proceeds of Sale Proceed from Issue of:											
Preference Shares											
Common Shares	210	6,648	480	357	1,182	54	199,146	5	193	32,893	267,636
Debentures											
Other Long Term Debt											
Total Issues	210	6,648	480	63,920	196,697	144,170	199,151	193	32,893	108,135	
Other (Net)	426	653	598	64,277	197,879	144,224	199,151	193	32,893	375,771	
Total External Sources	636	7,301	1,078	491	877	855	2,603	1,706	1,901	2,701	
Total Sources of Funds	29,779	29,181	122,942	64,768	198,756	145,079	201,754	1,899	34,794	378,472	
Less: Reduction of Long-Term Debt ⁶	2,446	2,775	1,203	120,452	199,077	120,672	186,272	80,306	(3,093)	365,726	
Less: Share Repurchase				3,348	4,173	3,332	3,083	4,374	6,506	19,424	
Total Funds (net)	27,333	26,356	121,739	117,104	194,904	117,340	183,189	75,932	(9,599)	1,534	
Cumulative Total	27,333	53,689	175,428	292,532	487,436	604,776	787,965	863,897	854,298	1,199,066	

⁴ Also called Internally generated funds.⁵ Cumulative totals of Internally generated funds, starting in 1971.⁶ Discretionary cash flow plus funds from external sources.

NAME OF FIRM:	STELCO	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Net Sources of Funds											
Discretionary Cash Flow	29,143	21,830	121,864	55,684	321	(24,407)	(15,482)	78,407	(37,887)	(12,746)	
Total Sale Proceeds											
Total Issue Proceeds	210	6,648	480	64,277	197,879	144,224	199,151	193	32,893	375,771	
Other (Net)											
Less: Reduction of Long Term Commitments											
Total Funds (net)	(2,446)	(2,775)	(1,203)	(3,348)	(4,173)	(3,332)	(3,083)	(4,374)	(6,506)	(20,958)	
	<u>27,333</u>	<u>26,356</u>	<u>121,739</u>	<u>117,104</u>	<u>194,904</u>	<u>117,340</u>	<u>183,189</u>	<u>75,932</u>	<u>(9,599)</u>	<u>344,768</u>	
Application of Funds											
Capital Expenditures for: Plant and Equipment											
Mine Development	94,180	90,834	109,532	130,545	230,501	166,878	141,389	137,615	193,725	192,497	
Total Capital Expenditures	897	4,200	6,981	4,949	2,261	5,622	3,219	7,686	10,277	(807)	
Long Term Investments											
Other Uses	95,077	95,034	116,513	135,494	232,762	172,500	144,608	145,301	204,002	191,690	
Total Uses of Funds											
Increase (Decrease) in Financial Resources											
Cumulative Total	(67,744)	(68,678)	5,226	(18,390)	(37,858)	(55,160)	38,581	(69,369)	(213,601)	153,078)	
	<u>(67,744)</u>	<u>(136,422)</u>	<u>(131,196)</u>	<u>(149,586)</u>	<u>187,444)</u>	<u>242,604)</u>	<u>204,023)</u>	<u>273,392)</u>	<u>(486,993)</u>	<u>(333,915)</u>	

Source: Stelco Ltd., Annual Reports and Prospectus.

**COMPARISON OF NET INCOME AS A PERCENTAGE OF SHAREHOLDERS EQUITY
STEEL MILLS VS. OTHER MAJOR SECTORS
1977 to 1980**

Table E4

	1980	1979	1978	1977
¹ Algoma	13.2	17.5	12.3	7.3
Stelco	9.5	14.0	11.4	9.3
Dofasco	14.5	18.7	15.0	12.4
² Pulp & Paper	18.9	19.7	12.6	9.6
³ Primary Metals	19.1	20.2	9.9	8.5
³ Manufacturing	15.6	15.8	12.6	11.2
³ Total Industrial	15.0	16.2	13.0	11.4

Source: 1. Financial Post Data Base
2. Ontario Corporation Tax Returns
3. Statistics Canada Cat. No. 61-003P, 61-003, 61-207, 61-208.

**COMPARISON OF NET INCOME AS A PERCENTAGE OF ASSETS
STEEL MILLS VS. OTHER MAJOR SECTORS**

1977 to 1980

Table E5

	1980	1979	1978	1977
¹ Algoma	9.7	11.5	9.2	6.7
Stelco	6.5	8.7	7.7	6.8
Dofasco	8.4	10.2	8.7	7.4
² Pulp & Paper	10.5	10.2	5.6	4.3
³ Primary Metals	10.4	11.3	5.4	4.3
³ Manufacturing	7.4	7.5	6.1	5.3
³ Total Industrial	6.9	7.2	5.8	5.1

Sources: 1. Financial Post Data Base
2. Ontario Corporation Tax Returns
3. Statistics Canada Cat. No. 61-003P, 61-003, 61-207, 61-208.

**COMPARISON OF PREFERRED DIVIDEND COVERAGE
(PRIOR CHANGES METHOD) BETWEEN
THE PULP PAPER BIG THREE AND
THE IRON AND STEEL BIG THREE,
1977-1980**

Table E6

	1980	1979	1978	1977
Pulp & Paper				
Abitibi-Price	3.3	5.6	5.8	3.3
Domtar	9.4	10.4	6.8	3.3
Great Lakes Forest Products ¹	8.8	8.7	12.5	-
Iron & Steel				
Algoma	4.0	4.1	2.8	1.6
Stelco	2.3	3.7	3.0	2.3
Dofasco	4.0	5.0	3.5	3.0

¹ No preferred shares—Common shares shown here.

Source: Financial Post Data Base

**COMPARISON OF NET RETURN ON ASSETS
BETWEEN THE PULP AND PAPER BIG THREE AND
THE IRON STEEL BIG THREE,
1977-1980**

Table E7

	1980	1979	1978	1977
Pulp & Paper				
Abitibi-Price	8.5	11.6	9.6	6.6
Domtar	9.6	11.7	9.3	5.6
Great Lakes Forest Products	17.3	15.3	10.0	10.0
Iron & Steel				
Algoma	9.7	11.5	9.2	6.7
Stelco	6.5	8.7	7.7	6.8
Dofasco	8.4	10.1	8.7	7.4

Source: Financial Post Data Base

**COMPARISON OF NET RETURN ON COMMON EQUITY
BETWEEN THE PULP AND PAPER BIG THREE AND
THE IRON STEEL BIG THREE,
1977-1980**

Table E8

	1980	1979	1978	1977
Pulp & Paper				
Abitibi-Price	15.5	24.6	21.2	11.5
Domtar	16.5	21.5	16.4	7.8
Great Lakes Forest Products	30.9	33.7	20.8	18.1
Iron & Steel				
Algoma	13.2	17.5	12.3	7.3
Stelco	9.5	14.1	11.4	9.3
Dofasco	14.5	18.7	15.0	12.4

Source: Financial Post Data Base

**COMPARISON OF PAYOUT RATIO (COMMON AND PREFERRED)
BETWEEN THE PULP AND PAPER BIG THREE AND
THE IRON STEEL BIG THREE,
1977-1980**

Table E9

	1980	1979	1978	1977
Pulp & Paper				
Abitibi-Price	47.6	32.6	28.5	28.5
Domtar	36.6	27.8	26.6	46.1
Great Lakes Forest Products ¹	11.4	11.5	8.0	-
Iron & Steel				
Algoma	21.9	16.9	13.7	24.7
Stelco	61.7	41.1	45.6	54.5
Dofasco	44.1	33.0	37.5	43.5

¹ Common shares only

Source: Financial Post Statistical Base

**COMPARISON OF NET RETURN ON TOTAL INVESTMENT CAPITAL
BETWEEN THE PULP AND PAPER BIG THREE AND
THE IRON STEEL BIG THREE,
1977-1980**

Table E10

	1980	1979	1978	1977
Pulp & Paper				
Abitibi-Price	10.0	13.9	11.5	7.8
Domtar	11.8	15.0	11.7	6.9
Great Lakes Forest Products	21.3	19.9	12.8	11.3
Iron & Steel				
Algoma	10.9	13.1	10.7	7.9
Stelco	7.4	10.0	8.9	7.7
Dofasco	9.6	12.0	10.0	8.4

Source: Financial Post Statistical Base

APPENDIX F

Jishu Kanri (Autonomous Self-Management)

The Japanese steel industry credits its excellent working relationship with the government and the workers for its success which is based on high quality. This section focuses on workers' contribution to the production process and end product. A leading aspect of Japanese workers' contribution to the production of quality goods is *jishu kanri* activities - the participation of workers in voluntary groups whose aim is to boost productivity and to improve product quality. *Jishu kanri* activities have a history of more than ten years in Japan's steel industry, with results that are worthy of study.

Voluntary small-group activities among blue-collar workers are common within the major manufacturing industries of Japan, and such group activities in the steel industry are *jishu kanri* (JK) activities. Other sectors call it quality control (QC), circle activities or zero defect (ZD) activities.

Typically, several workers initiate *jishu kanri* (JK) activities and choose one among them as group leader. Then they hold regular meetings to work out ways of improving operations at their work station. These initiatives are now managed in a systemized way so that information exchange with other such groups within the plant and with other plants can be carried out.

In most steel mills, as many as 75-80 percent of workers participate in JK activities. Though the achievement of a single JK project may be minor in scope, the total impact, financially and in terms of morale, is enormous. One integrated steel company, for example, reportedly saved more than Y10,000 million (U.S. \$50 million) a year as a result of its JK activities.

About 45 percent of JK work is done during working hours mostly between work interruptions and in standby time. Much of the remaining work is done after work hours at plant or outside. To encourage the JK groups, the Japan Iron and Steel Federation established its Jishu-Kanri Activities Committee in 1969. Some 29 steelmakers, operating 102 plants, were initial members of the Committee, which thus brought together 20,000 JK groups numbering 176,000 participants. By 1980, the Committee has grown to represent 46 steelmakers operating 164 plants, and 29,600 JK groups that include 197,000 participants.

Quality control (QC), industrial engineering (IE) and value engineering (VE) techniques are fully utilized by JK groups today in selecting and solving problems in the workplace.

The Committee furthers exchanges concerning JK activities and results through annual conventions, other meetings and overseas inspection tours. Overseas visits to leading steelmaking firms in Europe and the United States are arranged for foremen with outstanding performance records, in order to improve their leadership and administrative capabilities.

Some of the examples of JK activities are as follows:

- o A JK group working in a continuous hot strip mill reduced the amount of crop shear scrap by half in about three years, achieving a cost saving of some Y80 million (U.S. \$0.4 million) a year.
- o A six-member JK group working in a stainless steel slabbing mill raised product yield by 0.3%. This figure, small though it may seem, meant substantial savings given the high price of the product.
- o One JK group established an integrated control system covering steel-making, blooming and rolling on a real-time basis, raising the hot direct rolling system's efficiency. The production plan devised by the group is determined at the start of finish rolling at the shape mill and coordinates steelmaking, continuous casting and blooming schedules. The energy required to produce a ton of shapes has been reduced from 180,000 Kcal to 146,000 Kcal by this JK-developed improvement - a remarkable step forward from the conventional batch operation toward fully continuous production.

All of JK activities are not directed towards production only, but it covers other areas such as:

- o A telephone operators' JK group at an integrated steelworks tried to reduce telephone bills. The result was a sharp cut in the telephone bill from ¥8 million to ¥3.8 million in the following month.
- o A JK group invented a machine diagnosis system that can accurately detect the wear in bearing assemblies of rotating machinery without dismantling it. The meter is now available commercially, which provides an additional source of revenue for the company.

In summary, the JK activities concentrate on cost reduction, safety, maintenance, product quality improvement, efficiency improvement, better inspection, zero defects, morale improvement and pollution control.

This concept may be very beneficial if approved by Ontario labour unions and adopted in the manufacturing sector. Additional research in the area of production related activities may be beneficial for Ontario's manufacturing base.

APPENDIX G

Energy Usage in the Steel Industry

The concept of energy conservation in industry, including the steel industry, is not new. Following the OPEC oil crisis of 1973-74, most nations designed policies to reduce fuel consumption. In Canada, the Canadian Industry Energy Conservation Task Force was formed to set targets for energy conservation in each industrial sector. The steel industry's efforts were spearheaded by the Ferrous Metals Task Force for Energy Conservation which included the Ferrous Energy Research Association (FERA). The five members of FERA are Algoma, Dofasco, Stelco, Sidbec-Dosco and Sydney Steel. In 1974, FERA set out a goal to achieve a 3.3 percent reduction by 1980 in energy use per ton of raw steel produced. In 1974, an average ton of raw steel required 21.53 million BTU's of energy from coal, gas, fuel oil and electricity. The target for 1980 was 20.8 million BTU's. Generally, it was thought that "only a relatively modest potential exists in this industry (Iron and Steel) for the reduction of energy use per unit of output, even with large expenditures."¹ However, the industry managed to reach a 4.7 percent reduction by 1980. Much of the reduction (2.4 percent) was achieved during 1980, when energy use dropped to 20.51 million BTU's per ton from 21.02 million BTU's per ton in 1979.² Such a sizeable reduction in one year suggests that further large reductions may be possible in the future.

Steel-makers in the rest of the world also have been forced to reduce energy consumption rates. Between 1972 and 1978, the fuel ratio of oil and coke per tonne of steel production dropped by 11 percent in Italy, 7.2 percent in the U.S.A., 6.4 percent in Japan, 6.2 percent in Belgium, 4.4 percent in West Germany and 2.7 percent in Canada.³

¹ Ontario Ministry of Energy, Ontario Energy Demand Study-Industrial, Feb 1977, reprinted Nov. 1980, p.139.

² Canadian Industry Energy Task Force, 1980 Report, p.13.

³ Yoshifumi Kumagai, President of Sumitomo Metal Industries, Steel & Energy, p.87.

Japan consumes the least amount of energy per unit of steel output, at 466 kg. per tonne in 1978 compared to 546 kg. per tonne in Canada. In fuel oil alone, the Japanese used only 37 kg. per tonne of steel output, whereas Canadian steel-makers increased their use of fuel oil from 51 kg per tonne in 1973 to 88 kg per tonne in 1978, the highest among those nations listed above.

The federal government recently announced a \$42 million grant program for energy conservation in private enterprise in three of the four Atlantic Provinces. Nova Scotia, which was excluded from this program, already has an \$11 million DREE program in this area. There is no federal incentive to encourage energy conservation in Ontario, with the exception of a voluntary federal industrial arrangement whereby major steel producers meet three or four times per year to consult each other and to exchange ideas in energy conservation. This group, even though it has been in existence for six or seven years, still does not have a permanent office or research staff. However, efforts are still being made to improve energy conservation. A representative of this group, from Dofasco, is visiting Japan in October 1981 to learn about energy conservation.

Direct provincial involvement in energy conservation will not only increase the credibility of the group, but may help to facilitate research.

APPENDIX H
STATISTICAL INFORMATION ON
IRON AND STEEL MILLS (S.I.C. 291)
AND THE STEEL INDUSTRY IN GENERAL

ONTARIO: IRON AND STEEL MILLS (SIC 291)
PRINCIPAL STATISTICS, 1970 - 1979

Table H1

Year	No. of Establishments	Production and Related Workers			Total Activity			Value - Added (\$000's)	
		Number	Hours Paid (000's)	Wages (\$000's)	Wages and Salaries (\$000's)				
					Employees	Shipments (\$000's)			
1970	17	29,865	61,799	247,071	37,944	335,117	690,768		
1971	18	29,746	61,534	266,710	38,036	363,775	736,529		
1972	17	29,974	62,920	297,624	37,997	400,360	778,249		
1973	17	31,781	67,141	350,539	39,957	463,882	969,801		
1974	17	31,926	70,153	400,707	40,215	537,144	1,116,590		
1975	18	32,305	66,009	438,038	40,607	590,185	1,085,833		
1976	17	32,318	66,602	500,949	40,315	664,237	1,231,413		
1977	19	32,977	66,991	554,534	40,914	730,425	1,422,276		
1978	20	34,895	68,422	618,699	43,278	809,668	1,653,559		
1979	22	36,699	76,904	713,985	45,419	927,649	2,039,145		

Source: Statistics Canada, Iron and Steel Mills, Cat. No. 41-203.

CANADA: IRON AND STEEL MILLS (SIC 291)
PRINCIPAL STATISTICS, 1970 - 1979

Table H2

Year	No. of Establishments	Production and Related Workers			Total Activity			Value - Added (\$'000's)	
		Number	Hours	Paid (\$'000's)	Wages and Salaries (\$'000's)				
					Employees	Salaries (\$'000's)			
1970	45	38,317	79,657	309,128	49,169	423,985	1,691,662	835,956	
1971	50	38,308	79,270	333,581	49,601	461,627	1,764,037	866,948	
1972	48	38,378	80,841	369,891	49,758	408,216	1,900,799	909,369	
1973	45	41,202	86,245	438,622	53,008	595,382	2,317,520	1,154,569	
1974	47	42,091	91,870	513,882	54,253	701,909	3,036,163	1,385,329	
1975	46	42,169	86,419	554,499	54,003	761,004	3,147,693	1,348,021	
1976	46	40,573	84,213	611,758	51,978	832,503	8,460,059	1,468,650	
1977	48	41,295	84,747	677,595	52,709	917,892	3,943,555	1,683,276	
1978	50	44,791	89,851	777,594	56,669	1,041,367	4,959,619	2,082,750	
1979	53	46,977	98,901	897,436	59,167	1,188,608	5,859,261	2,436,631	

Source: Statistics Canada, Primary Iron and Steel, Cat. No. 41-001.

**ONTARIO STEEL INDUSTRY (S.I.C. 291, 292, 294)
CAPITAL AND REPAIR EXPENDITURES BY REGION,
FORECAST FOR 1981
(\$000's)**

Table H3

Region	SIC	Capital			Repair		Total	No. of Firms
		Capital Construction	Machinery & Equipment	Repair Construction	Machinery & Equipment			
01	2910	10	91	12	72		185	1
01	2940	10	10	15	10		45	3
02	2910	91,343	322,628	32,218	574,223	1,020,412		16
02	2920	904	9,885	1,906	16,769	29,464		11
02	2940	525	3,841	481	3,000	7,847		27
03	2920	2,750	8,615	300	2,200	13,865		1
03	2940	5	2,463	148	2,895	5,511		7
04	2910	3,700	146,000	8,985	187,420	346,105		1
04	2920		73,700	381	15,430	89,511		1
04	2940	50	205	165	1,222	1,642		2
05	2910		30		75	105		1
Ontario		95,053	468,749	41,215	761,790	1,366,807		19
Totals		3,654	92,200	2,587	34,399	132,840		13
		590	6,519	809	7,127	15,045		39

01	= Eastern Ontario	2910	Iron & Steel Mills.
02	= Central	2920	Pipe & Tube Mills.
03	= Southwestern	2940	Iron Foundries.
04	= Northeastern		
05	= Northwestern		

Source: Central Statistical Service, Confidential Data.

CANADA: IRON AND STEEL MILLS (SIC 291)
 CAPITAL EXPENDITURES, 1960 - 1980
 (\$ millions of dollars)

Table H4

Year	Actual Expenditures			Real Expenditures (Constant 1971 \$)		
	Construction	Machinery & Equipment	Total	Construction	Equipment	Machinery & Total
1960	23.8	91.0	114.8	34.8	118.8	153.6
1961	13.0	54.6	67.6	19.1	70.8	89.9
1962	20.9	92.0	112.9	30.6	115.7	146.3
1963	28.3	83.8	112.1	40.3	102.6	142.9
1964	36.6	169.5	206.1	50.7	199.2	249.9
1965	34.4	128.9	163.3	45.2	145.8	191.0
1966	35.1	175.5	210.6	43.4	192.4	235.8
1967	19.1	103.8	122.9	22.7	114.6	137.3
1968	11.7	53.7	65.4	13.8	59.3	73.1
1969	15.9	92.5	108.4	17.7	99.6	117.3
1970	39.7	168.3	207.9	42.1	172.7	214.8
1971	32.6	169.0	201.6	32.6	169.0	201.6
1972	36.2	170.9	207.1	34.2	166.6	200.8
1973	33.2	182.8	216.0	29.0	171.0	200.0
1974	81.3	328.4	409.7	61.1	269.6	330.7
1975	111.0	430.7	541.7	74.3	309.9	384.2
1976	108.6	334.2	442.8	66.6	225.5	292.1
1977	79.9	314.1	394.0	45.4	197.4	242.8
1978	52.5	257.1	309.5	28.0	147.4	175.4
1979	56.3	296.8	353.1	27.5	153.3	180.8
1980	86.3	531.6	617.8	39.0	245.9	284.9

¹ Deflated by implicit price indexes for non-business construction and machinery and equipment respectively (from Statistics Canada, National Income and Expenditures Accounts, Cat. No. 13-001).

Source: Statistics Canada, Capital and Repair Expenditures, Cat. No. 61.214.

CANADA: IRON AND STEEL MILL (SIC 291)
STEEL FURNACE CAPACITY; 1970 - 1980
(000's of tonnes)

Table H5

Year	Raw Steel Capacity			Total Capacity	Utilization Rate (%)³
	OH¹	BOF²	Electric		
1970	6,323	3,447	1,864	11,634	96.3
1971	6,323	3,992	2,081	12,396	89.1
1972	4,881	6,069	2,687	13,637	87.0
1973	4,881	6,105	2,702	14,096	95.0
1974	3,742	9,027	3,507	16,276	83.7
1975	3,742	9,186	3,720	16,730	77.9
1976	3,742	9,268	3,895	16,905	77.7
1977	3,742	9,524	3,746	17,012	80.1
1978	3,742	9,569	4,222	17,533	85.0
1979	3,742	10,186	4,228	18,157	88.6
1980	3,742	10,328	4,448	18,517	85.6

Source: Statistics Canada, Primary Iron and Steel, Cat. No. 41-001.

¹ Open Hearth

² Basic Oxygen Furnace

³ Production of raw steel as a percent of raw steel capacity.

CANADA: IRON AND STEEL MILLS (SIC 291)

ANNUAL PRODUCTION OF PIG IRON AND RAW STEEL, 1960 - 1980

Table H6

<u>Year</u>	<u>Pig Iron</u>		<u>Raw Steel (ingots & castings)</u>	
	<u>Net Tonnes</u> <u>000's</u>	<u>Annual Changes</u> <u>%</u>	<u>Net Tonnes</u> <u>000's</u>	<u>Annual Changes</u> <u>%</u>
1960	3,881	—	5,253	—
1961	4,461	14.9	5,866	11.7
1962	4,798	7.6	6,507	10.9
1963	5,366	11.8	7,430	14.2
1964	5,934	10.6	8,284	11.5
1965	6,409	8.0	9,098	9.8
1966	6,544	2.1	9,075	0.3
1967	6,296	-3.9	8,794	3.2
1968	7,605	20.8	10,207	16.1
1969	6,769	-12.4	9,351	-9.2
1970	8,243	21.8	11,200	19.8
1971	7,816	-5.5	11,040	-1.5
1972	8,495	8.7	11,860	7.4
1973	9,536	12.3	13,386	12.9
1974	9,422	-1.2	13,623	1.8
1975	9,150	-3.0	13,041	-4.5
1976	9,800	7.1	13,136	0.7
1977	9,611	-1.4	13,623	3.7
1978	10,338	7.0	14,899	9.4
1979	10,905	5.5	16,078	7.9
1980	10,890	-0.1	15,897	-1.1

Source: Statistics Canada Primary Iron and Steel, Cat. No. 41-001.

CANADA: IRON AND STEEL MILLS (SIC 291)
ANNUAL DOMESTIC SHIPMENTS OF ROLLING MILL PRODUCTS: BY PRODUCT LINES
(000's of Tonnes)

Table H7

	Rolling Mill Products						1979					
	1960		1965		1970		1975		1979		1980	
	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
1. Ingots and Semi-Finished Shapes	136	4.1	277	4.7	303	4.3	342	3.9	393	3.7	408	4.3
2. Bars:												
a) Hot-Rolled	59	1.8	90	1.5	110	1.6	107	1.2	181	1.7	150	1.6
- Structural Shapes	305	9.2	583	9.9	587	8.3	550	6.3	528	5.0	557	5.8
- Concrete Reinforcing Bars	332	10.0	581	9.9	650	9.2	811	9.3	1,073	10.1	857	9.0
- Other Hot-Rolled Bars												
b) Cold-Rolled Bars	33	1.0	67	1.1	60	.9	79	.9	115	1.1	94	1.0
3. Flat Products:												
a) Hot-Rolled												
- Plate (including skelp for Pipes and Tubes)	452	13.6	841	14.3	1,046	14.9	1,320	15.2	1,465	13.8	1,536	16.1
- Sheets and Strip	487	14.6	942	16.0	1,257	17.9	2,072	23.8	2,376	22.4	1,893	19.8
b) Cold-Rolled												
- Coated Sheet and Strip	650	19.5	1,112	18.9	1,239	17.6	1,402	16.1	1,800	17.0	1,575	16.5
- Galvanized Sheet	231	6.9	417	7.1	494	7.0	715	8.2	947	8.9	849	8.9
4. Wire Rods	284	8.5	396	6.7	410	5.8	492	5.7	780	7.4	676	7.1
5. Heavy Structural Shapes	150	4.5	396	6.7	511	7.3	494	5.7	674	6.4	8942	9.4
6. Railway Products:												
- Rails	172	5.2	148	2.5	288	4.1	239	2.8	224	2.1		
- Tie Plates and Track Materials	40	1.2	39	.7	83	1.2	78	.9	64	.6	68	.7
7. Total Tonnes	<u>3,331</u>	<u>100.1</u>	<u>5,889</u>	<u>100.0</u>	<u>7,038</u>	<u>100.1</u>	<u>8,701</u>	<u>100.0</u>	<u>10,620</u>	<u>100.2</u>	<u>9,557</u>	<u>100.2</u>

¹Totals may not add to 100.0 due to rounding.

Source: Statistics Canada, Primary Iron and Steel, Cat. No. 41-001.

**THE BIG THREE STEEL COMPANIES:
PRODUCTIVITY COMPARISONS, 1971-1980**

Table H8

Year	ALGOMA			STELCO			DOFASCO		
	No. of Employees	Productivity¹	Index²	No. of Employees	Productivity¹	Index²	No. of Employees	Productivity¹	Index²
1971	11,775	181.7	100.0	21,351	198.5	100.0	9,300	240.8	100.0
1972	12,106	181.8	100.0	21,582	211.5	106.5	9,700	259.4	107.7
1973	11,753	204.5	112.5	22,580	229.9	115.8	10,600	259.8	107.9
1974	12,568	199.5	109.8	23,251	213.2	107.4	11,500	241.4	100.2
1975	12,880	193.6	106.5	23,192	211.1	106.3	11,700	236.7	98.3
1976	12,202	214.7	118.2	22,691	228.9	115.3	11,500	263.1	109.3
1977	12,775	211.2	116.2	22,942	223.0	112.3	11,300	267.6	111.1
1978	13,232	227.4	125.2	23,712	211.7	106.6	12,300	264.6	109.9
1979	14,282	224.1	123.3	25,032	212.4	107.0	13,700	268.8	111.6
1980	14,265	202.2	111.3	25,094	226.9	114.3	14,100	236.8	98.3

1 Tonnes of Raw Steel Produced per Employee.

2 Index of Productivity.

Source: Algoma Steel Corporation Limited, The Steel Company of Canada Ltd., and Dominion Foundries and Steel Limited Annual Reports.

CANADA: IRON AND STEEL MILLS (SIC 291)
WAGES, PRICES AND PRODUCTIVITY, 1971 - 1980

Table H9

Year	Prices		Wages		Productivity		% Change Per Annum
	Index	% Change Per Annum	Average Per Hour	Index	Value-Added (000's 1971 \$)	Productivity ¹	
1971	100.0	-	4.42	100.0	736,528	11.97	-
1972	105.8	5.8	4.95	112.0	735,595	11.69	-2.4
1973	115.2	8.9	5.29	120.0	841,841	12.54	7.3
1974	148.5	28.9	5.73	130.0	751,912	10.72	-17.0
1975	171.8	15.7	6.52	147.5	632,033	9.57	-12.0
1976	181.8	5.8	7.47	169.0	677,345	10.17	6.3
1977	193.1	6.2	8.16	184.6	736,549	10.99	8.1
1978	213.7	10.7	8.84	200.0	773,776	11.31	2.9
1979	248.4	16.2	9.55	216.1	820,912	10.67	-6.0
1980	269.9	8.7	10.30	234.6	8.6	n.a.	n.a.

¹ Real Value - Added/Hour (1971 Dollars)

Source: Statistics Canada, Industry Price Indexes, Cat. No. 62-011; Primary Iron and Steel, Cat. No. 41-001.

CANADA: IRON AND STEEL MILLS (SIC 291)
WAGES, PRICES AND PRODUCTIVITY, 1971-1980

Table H10

Year	Prices		Wages		Productivity		% Change Per Annum
	Index	% Change Per Annum	Average Per Hour	Index	% Change Per Annum	Value-Added (000's 1971 \$)	
1971	100.0	-	4.27	100.0	-	866,740	10.94
1972	105.8	5.8	4.78	100.9	11.9	859,517	10.63
1973	115.2	8.9	5.11	119.7	6.9	1,002,230	11.62
1974	148.5	28.9	5.61	131.4	9.8	932,881	10.15
1975	171.8	15.7	6.45	151.1	15.0	784,645	9.08
1976	181.8	5.8	7.12	166.7	10.4	806,838	9.59
1977	193.1	6.2	7.97	186.7	11.9	871,712	10.29
1978	213.7	10.7	8.60	201.4	7.9	974,614	10.84
1979	248.4	16.2	9.33	218.5	8.5	980,930	9.92
1980	269.9	8.7	10.20	238.9	9.3	n.a.	n.a.

1 Real Value - Added/Hour (1971 Dollars)
Source: Statistics Canada, Industry Price Indexes, Cat. No. 62-011; Primary Iron and Steel, Cat. No. 41-001.

CANADA: IRON AND STEEL MILLS (SIC 291)
PRODUCTIVITY, 1960-1980

Table H11

<u>Year</u>	<u>Raw Steel (Ingots & Castings) Net Tonnes/Man-Hour</u>	<u>Index (1960 = 100.0)</u>	<u>Annual Change(%)</u>
1960	.0894	100.0	—
1961	.9029	103.9	3.9
1962	.1008	112.8	8.6
1963	.1086	121.5	7.7
1964	.1094	122.4	0.7
1965	.1145	128.1	4.7
1966	.1219	136.4	6.5
1967	.1247	139.5	2.3
1968	.1301	145.5	4.3
1969	.1194	121.9	-19.4
1970	.1402	156.8	28.6
1971	.1518	169.8	8.3
1972	.1487	166.3	-2.1
1973	.1601	179.1	7.7
1974	.1561	174.6	-2.6
1975	.1620	181.2	3.8
1976	.1615	180.6	-0.3
1977	.1675	187.4	3.8
1978	.1693	189.4	1.1
1979	.1701	190.3	0.5
1980	.1737	194.3	2.1

Source: Statistics Canada, Primary Iron and Steel, Cat. No. 41-001, and Employment, Earnings and Hours, Cat. No. 72-002.

IRON AND STEEL IN A TYPICAL NORTH AMERICAN BUILT AUTO, 1980

Table H12

Year	Low Carbon Steel	High Strength Steel	Stainless Steel	Total Steel	Total Iron and Steel		Iron	Total Weight of Auto	Iron and Steel as a Percent of Total Wt.
					1978	1,915	133	26	2,074
1979	1,813	155	27	1,995	492	2,487	3,452	72%	
1980	1,737	175	28	1,940	484	2,424	3,363	72%	
1981	1,639	195	28	1,862	414	2,276	3,242	70%	
1982	1,547	217	28	1,792	354	2,146	3,126	69%	
1983	1,460	242	28	1,730	302	2,032	3,014	67%	
1984	1,378	269	28	1,668	259	1,927	2,905	64%	
1985	1,300	300	28	1,628	221	1,849	2,800	66%	

Sources: Ward's Automotive Annual, and Dofasco which credits General Motors Corporation, Ford Motor Company and the Chrysler Corporation.

CANADIAN CUSTOMS TARIFF ON PRINCIPAL IRON AND STEEL PRODUCTS
 (Rates are Dollars per Net Ton or Percentage of Value)

Most Favoured Nation Rates as of:

Tariff Item	Products Abbreviated Designations	for 1987 (Phased-In)²		
		July, 1967¹	July, 1981	Other
37400-1	A. <u>Unfinished Steel:</u> Pig Iron Raw Steel & Forms (37700-1, 37705-1)	FREE FREE	FREE FREE	FREE FREE
37800-1 37900-1 37905-1	B. <u>Semi-Finished:</u> Blooms, Slabs, Billets and Sheet Bars Bars or Rods, Hot Rolled Bars or Rods, Cold Drawn	5% 10% 12.5%	5% 10% 12.5%	5% 10% 12.5%
37910-1 37920-1	C. <u>Further Processed:</u> Bars or Rods, Further Processed Wire Rods, to .375", for Fencing	12.5% FREE	12.5% FREE	12.5% FREE
38001-1 38002-1 38003-1 38004-1	D. <u>Shapes or Sections:</u> Structural Shapes Wide Flange Beams, 10"-18" (not made in Canada) Heavy Structural (not made in Canada) Sash to Casement Sections	\$ 5.00 FREE \$ 7.00	\$ 5.00 FREE \$ 7.00	\$ 6.30 \$ 6.30
38100-1 38105-1 38110-1 38201-1 38202-1 38203&4-1 38205-1 38207-1 38225-1 38400-1 38500-1	E. <u>Plate, Sheet or Strip:</u> Plate Plate, Flanged or Dished Plate, Fabricated or Further Processed Sheet or Strip, Hot-Rolled Sheet or Strip, Cold-Rolled Tin & Zinc Plate Sheet or Strip, Coated Sheet or Strip, Electrical, Silicon Content 0.75% or more Sheet or Strip, Electrical, Silicon Content 2.90% or more Plate, Sheet or Strip, Hot or Cold-rolled (including skelp for use in the manufacture of pipes or tubes Sheet or Strip, Terne-Coated	10% 15% 12.5% 10% 12.5% 12.5% 12.5% 12.5% 12.5% 12.5% 7.5% 7.5%	10% 15% 12.5% 10% 12.5% 12.5% 12.5% 12.5% 12.5% 12.5% FREE	10% 11.2% 10% 10% 12.5% 8% 8% 10% 8% 10% FREE

Table H13
page 2 of 2

F. Railway Products:											
38700-1	Rails		10%		10%		7.8%		6.8%		%
38710-1	Tie Plates, Fish Plates, Splice Bars, Rail Joints	\$ 7.00	\$ 7.00	\$ 6.46	\$ 6.46	\$ 6.46	\$ 6.46	\$ 6.46	\$ 6.46	\$ 6.46	%
43030-1	Railway Spikes	17.5%	17.5%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	%
G.	<u>Castings and Forgings</u>										
39000-1	Castings or Iron or Steel, in the rough	15%	15%	15%	15%	15%	15%	15%	15%	15%	%
39101-1	Castings - Ingot Moulds	FREE	FREE	FREE	FREE	FREE	FREE	FREE	FREE	FREE	%
39102-1	Castings - Moulds n.o.p.	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	%
39200-1	Forgings of Iron or Steel, in any degree or manufacture, n.o.p.	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	%
H.	<u>Fasteners</u>										
43015-1	Wire Nails over 1", and Wire Roofing Nails of all Sizes	\$ 20.00	\$ 1.00	\$.80	\$.80	\$.80	\$.80	\$.80	\$.80	\$.80	.80
43020-1	Cut Nails	\$ 9.00	\$.45	\$.41	\$.41	\$.41	\$.41	\$.41	\$.41	\$.41	.41
43025-1	Wire Nails less than 1", and Nails and Tacks of all Kinds	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%
43035-1	Spikes n.o.p.	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%

1 Rates following implementation of the Kennedy round of GATT negotiations.

2 New rates to apply in 1987 following implementation of the Tokyo round of GATT negotiations.
Source: Government of Canada, Department of Finance.

**VALUE OF IMPORTS & EXPORTS OF
CARBON & ALLOY STEEL
IN CANADA
(dollars per tonne)**

Table H14

<u>Type</u>	<u>Import Value</u>	<u>Export Value</u>	<u>Difference</u>
Ingot & Semi-Finished	326.19	264.05	62.14
Rails	686.90	336.84	350.06
Wire Rods	482.93	408.12	74.81
Hot Rolled Bars	1020.54	482.57	537.98
Cold Rolled Bars	1301.08	1054.81	246.27
Tie Plate	1557.55	568.52	989.03
Plates (incl. pipes & tubes)	697.51	383.55	313.96
Hot Rolled Sheet & Strip	532.63	479.37	53.26
Cold Rolled Sheet & Strip	1413.79	411.76	1002.03
Galvanized Sheet & Strip	<u>577.26</u>	<u>493.11</u>	<u>84.15</u>
Average:	655.05	429.12	225.93

Source: Statistics Canada and A. E. Ames

CANADIAN TRADING OF STEEL, 1980
tonnes)

Table H15

Product	Imports			Exports	
	Carbon Steel	Alloy Steel	Total	Total	Net
Ingots & Semi-Finished	91,985	12,657	104,642	326,663	222,021
Railway Rails	23,448	—	23,448	240,318	216,870
Wire Rods	106,496	—	106,496	541,842	435,346
Structurals - Heavy	169,452	—	169,452	299,405	129,953
Structural Bars	15,279	22,329	37,608		
Concrete Reinforcing Bars	8,135	—	8,135	297,375	189,110
Other Hot-Rolled Bars	37,852	24,670	62,522		
Cold Finish Bars	8,300	4,077	12,377	8,460	(3,917)
Tie Plate and Tack	5,852		5,852	13,375	7,523
Plates including Plate for Pipes and Tubes	207,522	33,523	241,045	339,960	98,915
Hot Rolled Sheet & Strip	192,721	24,888	217,609	650,480	432,871
Cold Rolled Sheet & Strip	51,161	40,746	91,907	135,932	44,025
Galvanized Sheet & Strip	31,201	—	31,201	165,983	134,782
TOTAL	949,404	40,746	1,112,294	3,019,793	1,907,499

Source: Statistics Canada and A. E. Ames, 1981.

CANADA: IRON AND STEEL MILLS (SIC 291)
ANNUAL EXPORTS OF ROLLED STEEL PRODUCTS, 1965-1980
 (000's of Tonnes)

Table H16

Destination of Shipments	1965	1970	1976	1977	1978	1979	1980
Domestic	5,889.5	7,037.1	8,527.4	8,759.4	9,863.9	10,620.8	9,554.1
Export:							
U.S.A.	n.a.	742.8	746.3	1,190.7	1,431.2	1,298.8	1,393.6
Other	n.a.	445.8	547.4	377.4	397.5	310.3	1,232.8
Total Exports	553.0	1,188.6	1,293.7	1,568.1	1,828.7	1,609.1	2,737.4
TOTAL	6,442.5	8,225.7	9,821.1	10,327.5	11,692.6	12,229.9	12,291.5
Export as % of Total	8.6	14.4	13.2	15.2	15.6	13.2	22.3
Exports as % of Domestic	9.4	16.9	15.2	17.9	18.5	15.2	28.7

refers to all exports.

source: Statistics Canada, Primary Iron and Steel, Catalogue No. 41-001.

INTERNATIONAL STEEL PRICE COMPARISON, MARCH 1981
(U.S. Dollars Per Ton of Steel)

Table H17

	Midwest-U.S.A.			Canada		France ¹		Japan	
	List	TPM ²	Spot	List	Spot	List	Spot	List	Spot
Wide Flange Beam	488	465	445	378	455	313	291	393	317
Carbon Plate	482	444	450	347	376	338	297	369	356
Hot Rolled Coil	390	397	360	315	340	327	272	343	356
Galvanized	596	575	560	486	539	431	357	486	569
Hot Rolled Bar	496	544	480	407	-	324	282	451	425

¹ At border

² Trigger Price Mechanism - base price for the quarter

Source: Metal Intelligence International, 26 March 1981.

NET CANADIAN IMPORTS AND EXPORTS OF STEEL
JANUARY-JUNE, 1981
(Tonnes)

Table H18

	Imports	Exports	Import Reliance ¹
January	70,534	220,498	8.1
February	84,159	174,243	7.4
March	122,885	280,772	9.4
April	154,360	181,532	9.4
May	175,401	92,485	15.1
June	278,976	79,626	17.8
Total	886,315	1,029,156	

¹Imports as a percent of domestic shipments.

Source: Bell Gouinlock Ltd. as reported in the Globe and Mail, Sept. 22, 1981

**STEEL IMPORTS INTO CANADA
JANUARY-JUNE, 1980-81
(tons)**

Table H19

	<u>1981</u>	<u>1980</u>	<u>% Change 1980-81</u>
January	114,564	191,277	-40.1
February	235,500	347,077	-32.1
March	413,464	499,238	-17.2
April	623,004	675,922	-7.8
May	863,474	817,764	5.6
June	1,234,250	960,692	28.5

Source: Commercial Research, Stelco, 1981

APPENDIX J
STATISTICAL INFORMATION ON
STEEL PIPE AND TUBE MILLS
(S.I.C. 292)

ONTARIO: STEEL PIPE AND TUBE MILLS (SIC 292)
PRINCIPAL STATISTICS, 1970 - 1979

Table J1

<u>Year</u>	<u>No. of Establishments</u>	<u>Production and Related Workers</u>			<u>Total Activity</u>			<u>Value - Added (\$000's)</u>
		<u>Number</u>	<u>Hours Paid (000's)</u>	<u>Wages (\$000's)</u>	<u>Employees</u>	<u>Salaries (\$000's)</u>	<u>Wages and Salaries (\$000's)</u>	
1970	11	2,810	6,349	23,243	3,609	31,458	49,842	
1971	12	2,806	6,267	24,972	3,565	33,257	56,630	
1972	13	3,222	7,005	29,541	4,011	39,532	67,970	
1973	11	2,458	5,562	25,834	3,065	34,109	56,658	
1974	13	2,684	5,973	30,057	3,291	39,397	67,850	
1975	12	2,468	5,548	31,362	3,110	41,683	77,156	
1976	13	2,320	5,107	32,848	2,929	43,742	77,097	
1977	14	2,249	4,892	32,896	2,828	43,920	78,421	
1978	14	2,505	5,491	39,917	3,068	51,922	110,335	
1979	20	2,872	6,362	53,097	3,527	69,408	142,035	

Source: Statistics Canada, Steel Pipe and Tube Mills, Cat. No. 41-220.

CANADA: STEEL PIPE AND TUBE MILLS (SIC 292)
WAGES, PRICES AND PRODUCTIVITY, 1971 - 1980

Table J2

Year	Prices		Wages		Productivity	
	Index	% Change Per Annum	Average \$ Per Hour	% Change Per Annum	Value-Added (000's 1971 \$)	Productivity¹
1971	100.0	2.8	3.88	7.2	86,564	9.19
1972	102.9	2.9	4.18	7.7	110,593	9.89
1973	111.5	8.4	4.58	9.6	105,269	10.81
1974	132.0	18.4	4.98	8.7	112,696	10.95
1975	162.9	23.4	6.19	24.3	102,645	9.71
1976	179.1	9.9	6.70	8.2	82,393	8.29
1977	197.8	10.4	6.99	4.3	76,735	7.34
1978	218.0	10.2	7.56	8.2	101,554	8.60
1979	248.1	13.8	8.64	14.3	112,155	9.95
1980	272.9	10.0	n.a.	n.a.	n.a.	n.a.

Source: Statistics Canada, Industry Price Indexes, Cat. No. 62-011, Steel Pipe and Tube Mills, Cat. No. 41-220

1 Real Value - Added/Hour (1971 Dollars)

ONTARIO: STEEL PIPE AND TUBE MILLS (SIC 292)
EMPLOYMENT, EARNINGS AND HOURS, 1960-1979

Table J3

Year ¹	Employment		Hours Worked ² (000's)	Average Earnings	
	Total	Hourly		Weekly \$	Hourly \$
1960	2,338	1,879	—	100.25	—
1961	2,289	1,856	—	105.62	—
1962	2,643	1,983	4,462	114.83	2.48
1963	2,695	2,077	4,592	109.41	2.57
1964	2,986	2,321	5,198	116.65	2.71
1965	3,300	2,565	5,667	115.60	2.72
1966	3,191	2,486	5,391	119.81	2.87
1967	3,206	2,501	5,260	118.42	2.93
1968	3,415	2,679	5,839	133.14	3.18
1969	3,381	2,603	5,768	142.65	3.35
1970	3,609	2,810	6,349	159.06	3.66
1971	3,565	2,805	6,267	171.14	3.98
1972	4,011	3,222	7,005	176.32	4.22
1973	3,065	2,458	5,562	202.12	4.64
1974	3,291	2,684	5,973	215.36	5.03
1975	3,100	2,468	5,548	244.37	5.65
1976	2,929	2,320	5,107	272.28	6.43
1977	2,828	2,249	4,892	281.29	6.72
1978	3,068	2,505	5,491	306.44	7.27
1979	3,527	2,872	6,362	355.53	8.35

¹ November data.

² Hourly employees only.

Source: Statistics Canada, Employment, Earnings and Hours, Cat. No. 72-002.

CANADA: STEEL PIPE AND TUBE MILLS (SIC 292)
EMPLOYMENT, EARNINGS AND HOURS, 1960-1979

Table J4

Year ¹	Employment		Hours Worked ² (000's)	Average Earnings	
	Total	Hourly		Weekly \$	Hourly \$
1960	3,129	2,460	—	97.31	—
1961	3,407	2,587	—	103.19	2.40
1962	3,676	2,768	6,130	104.19	2.45
1963	3,840	3,002	6,479	107.18	2.58
1964	4,437	3,468	7,741	111.14	2.59
1965	4,799	3,699	8,088	112.44	2.67
1966	4,795	3,702	7,966	117.83	2.85
1967	5,012	3,894	8,202	119.68	2.95
1968	5,441	4,330	9,464	133.18	3.17
1969	5,146	3,920	8,634	139.20	3.29
1970	5,314	4,270	9,528	155.18	3.62
1971	5,306	4,292	9,424	164.24	3.88
1972	6,268	5,114	11,181	175.69	4.18
1973	5,288	4,417	9,734	194.00	4.58
1974	5,845	4,866	10,289	202.45	4.98
1975	5,785	4,898	10,575	257.12	6.19
1976	5,546	4,656	9,941	274.94	6.70
1977	5,634	4,704	10,460	298.93	6.99
1978	6,289	5,301	11,809	323.77	7.56
1979	6,480	5,221	11,270	358.85	8.64

¹ November data.

² Hourly employees only.

Source: Statistics Canada, Employment, Earnings and Hours, Cat. No. 72-202.

**ONTARIO: STEEL PIPE AND TUBE MILLS (SIC 292)
WAGES, PRICES AND PRODUCTIVITY, 1971 - 1980**

Table J5

<u>Year</u>	<u>Prices</u>		<u>Wages</u>		<u>Productivity</u>		<u>% Change Per Annum</u>
	<u>Index</u>	<u>% Change Per Annum</u>	<u>Average \$ Per Hour</u>	<u>% Change Per Annum</u>	<u>Value-Added (000's 1971 \$)</u>	<u>Productivity¹</u>	
1971	100.0	—	3.98	8.7	56,630	9.04	12.0
1972	102.9	2.9	4.22	6.0	66,054	9.43	4.3
1973	111.5	8.4	4.64	10.0	50,814	9.14	-3.2
1974	132.0	18.4	5.03	8.4	51,402	8.61	-6.2
1975	162.9	23.4	5.65	12.3	47,364	8.54	-0.8
1976	179.1	9.9	6.43	13.8	43,047	8.43	-1.3
1977	197.8	10.4	6.72	4.5	39,647	8.10	-4.1
1978	218.0	10.2	7.27	8.2	50,612	9.00	13.8
1979	248.1	13.8	8.35	14.9	57,249	9.22	-2.4

1 Real Value - Added/Hour (1971 Dollars).

Source: Statistics Canada, Industry Price Indexes, Cat. No. 62-011, and Steel Pipe and Tube Mills, Cat. No. 41-220.

CANADA: STEEL PIPE AND TUBE MILLS (SIC 292)
PRINCIPAL STATISTICS, 1970 - 1979

Table J6

<u>Year</u>	<u>No. of Establishments</u>	<u>Production and Related Workers</u>			<u>Total Activity</u>			<u>Value - Added (\$000's)</u>
		<u>Number</u>	<u>Hours Paid (000's)</u>	<u>Wages (\$000's)</u>	<u>Employees</u>	<u>Wages and Salaries (\$000's)</u>	<u>Shipments (\$000's)</u>	
1970	25	4,270	9,528	34,457	5,314	45,041	252,219	76,558
1971	26	4,292	9,424	36,656	5,306	47,673	273,581	86,564
1972	28	5,114	11,181	46,720	6,268	60,746	340,408	113,801
1973	24	4,417	9,734	44,559	5,288	55,572	319,674	117,375
1974	26	4,866	10,289	51,227	5,845	65,016	447,134	148,759
1975	25	4,898	10,575	65,488	5,785	79,326	561,454	167,210
1976	25	4,656	9,941	66,566	5,547	81,655	498,267	147,567
1977	27	4,704	10,460	73,120	5,634	90,397	503,758	151,781
1978	31	5,301	11,809	89,247	6,289	109,519	657,807	221,388
1979	36	5,221	11,270	97,424	6,480	124,902	838,072	278,259

Source: Statistics Canada, Steel Pipe and Tube Mills, Cat. No. 41-220.

APPENDIX K
STATISTICAL INFORMATION ON
IRON FOUNDRIES
(S.L.C. 294)

ONTARIO: IRON FOUNDRIES (SIC 294)
PRINCIPAL STATISTICS, 1970-1979

Table K1

Year	No. of Establishments	Number	Production and Related Workers			Employees & Salaries (\$000's)	Value of Shipments (\$000's)	Value-Added (\$000's)
			Hours Paid (000's)	Wages	Total Activity			
1970	57	6,462	13,594	47,640	7,444	57,676	150,652	87,654
1971	58	5,865	12,347	46,800	6,776	56,493	148,541	84,780
1972	59	5,814	12,545	50,621	6,735	60,841	162,027	96,076
1973	56	6,277	13,326	60,482	7,300	72,765	198,675	114,088
1974	57	6,884	14,274	66,164	8,016	81,372	266,379	143,643
1975	55	6,510	13,271	69,301	7,527	84,304	284,957	159,481
1976	57	5,905	12,199	76,344	6,902	93,421	312,243	170,002
1977	53	6,145	12,633	87,009	7,130	105,629	343,601	181,944
1978	54	6,167	12,324	92,497	7,152	112,738	347,981	185,639
1979	59	6,358	13,045	101,796	7,465	126,664	336,355	199,351

Source: Statistics Canada, Iron Foundries, Cat. No. 41-226.

CANADA: IRON FOUNDRIES (SIC 294)
PRINCIPAL STATISTICS, 1970-1979

Table K2

Year	No. of Establishments	Number	Production and Related Workers		Total Activity		Value-Added (\$'000's)
			Hours Paid (000's)	Wages (\$'000's)	Employees & Salaries (000's)	Value of Shipments (\$'000's)	
1970	116	9,065	19,349	63,648	10,663	79,320	212,290
1971	116	8,400	17,914	62,764	8,897	77,781	215,246
1972	115	8,446	18,362	68,818	9,948	84,891	233,487
1973	113	9,305	19,874	82,471	10,965	101,508	284,121
1974	111	10,216	21,456	95,263	12,504	118,752	398,746
1975	107	9,776	20,128	101,641	11,480	126,301	218,311
1976	110	8,639	17,947	107,302	10,365	135,538	232,752
1977	106	8,739	17,863	118,382	10,459	148,144	237,751
1978	110	8,812	17,778	128,781	10,472	161,088	250,701
1979	115	8,835	18,121	136,360	10,520	171,985	266,848
						538,345	291,576

Source: Statistics Canada, Iron Foundries, Cat. No. 41-226.

ONTARIO: IRON FOUNDRIES (SIC 294)
WAGES, PRICES AND PRODUCTIVITY, 1971 - 1980

Table K3

Year	Prices		Wages		Productivity		% Change Per Annum
	Index	% Change Per Annum	Average Per Hour	% Change Per Annum	Value-Added (000's 1971 \$)	Productivity	
1971	100.0	3.3	3.82	6.7	84,780	6.87	3.2
1972	103.0	3.0	4.36	14.1	93,277	7.44	8.3
1973	109.5	6.3	4.29	-1.6	104,189	7.82	5.1
1974	141.6	29.3	5.17	20.5	101,443	7.11	-10.0
1975	168.4	18.9	6.07	17.4	94,704	7.14	0.4
1976	181.0	7.5	6.68	10.0	93,923	7.70	7.8
1977	189.6	4.6	7.44	11.4	95,962	7.60	-1.3
1978	200.1	5.5	8.16	9.7	92,773	7.53	-0.9
1979	223.3	11.6	8.28	1.5	89,275	6.84	-10.1
1980	243.0	8.8	8.76	5.8	—	—	—

1 Real Value - Added/Hour (1976 Dollars).

Source: Statistics Canada, Industry Price Indexes, Cat. No. 62-011; Iron Foundries, Cat. No. 41-226.

CANADA: IRON FOUNDRIES (SIC 294)
WAGES, PRICES AND PRODUCTIVITY, 1971 - 1980

Table K4

<u>Year</u>	<u>Prices</u>		<u>Wages</u>		<u>Productivity</u>	
	<u>Index</u>	<u>% Change Per Annum</u>	<u>Average \$ Per Hour</u>	<u>% Change Per Annum</u>	<u>Value-Added Per Hour</u>	<u>% Change</u>
1971	100.0	3.3	3.60	4.7	120,040	4.9
1972	103.0	3.0	4.12	14.4	131,490	6.9
1973	109.5	6.3	4.11	-0.2	147,230	3.5
1974	141.6	29.3	5.04	22.6	154,170	-3.1
1975	168.4	18.9	5.86	4.2	138,210	-4.7
1976	181.0	7.5	6.52	11.3	131,350	6.6
1977	189.6	4.6	7.27	11.5	132,220	1.1
1978	200.1	5.5	7.92	8.9	133,220	0.7
1979	223.3	11.6	8.11	2.4	130,580	-3.3
1980	243.0	8.8	8.65	6.7	n.a.	

¹Real Value-Added Per Hour (1976 Dollars.)

Source: Statistics Canada, Industry Price Indexes, Cat. No. 62-011, and Iron Foundries, Cat. No. 41-226.

Source: Statistics Canada, Industry Price Indexes, Cat. No. 62-011, Iron Foundations, Cat. No. 41-226.

**ONTARIO: IRON FOUNDRIES (SIC 294)
EMPLOYMENT, EARNINGS AND HOURS, 1960-1980**

Table K5

Year¹	Employment		Hours Worked² (000's)	Average Earnings	
	Total	Hourly		Weekly \$	Hourly \$
1960	—	—	—	83.53	2.08
1961	—	—	—	86.66	2.10
1962	—	—	—	89.60	2.16
1963	—	—	—	93.22	2.24
1964	—	—	—	101.22	2.37
1965	—	—	—	105.23	2.48
1966	8,024	6.915	13,999	103.52	2.54
1967	7,389	6,343	15,434	103.20	2.67
1968	8,809	7,583	16,304	124.25	3.05
1969	7,979	6,773	15,266	131.31	3.23
1970	7,822	6,535	13,594	148.41	3.58
1971	7,300	6,100	12,347	159.76	3.82
1972	7,600	6,500	12,545	186.69	4.36
1973	7,000	5,900	13,326	179.09	4.29
1974	8,300	7,100	14,274	206.01	5.17
1975	7,300	6,100	13,271	242.45	6.07
1976	7,700	6,300	12,199	277.25	6.68
1977	7,700	6,400	12,633	302.78	7.44
1978	7,700	6,400	12,324	332.95	8.16
1979	6,500	5,200	13,045	334.30	8.28
1980	5,400	4,200	8,714	355.34	8.76

¹ November data.

² Hourly employees only.

Source: Statistics Canada, Employment, Earnings and Hours, Cat. No. 72-002.

CANADA: IRON FOUNDRIES (SIC 294)
EMPLOYMENT, EARNINGS AND HOURS, 1960-1980

Table K6

Year¹	Employment		Hours Worked² (000's)	Average Earnings	
	Total	Hourly		Weekly \$	Hourly \$
1960	—	—	—	81.75	1.99
1961	—	—	—	85.64	2.02
1962	—	—	—	86.78	2.08
1963	—	—	—	91.10	2.17
1964	—	—	15,784	98.43	2.28
1965	—	—	20,057	103.22	2.40
1966	11,210	9,448	22,311	101.32	2.45
1967	10,282	8,618	24,599	102.95	2.58
1968	11,886	9,930	22,022	119.68	2.91
1969	11,039	9,074	20,974	127.85	3.12
1970	10,800	8,800	19,349	13,837	3.44
1971	10,300	8,500	17,914	151.96	3.60
1972	10,800	9,100	18,362	174.98	4.12
1973	10,700	8,900	19,874	172.79	4.11
1974	12,300	10,200	21,456	200.53	5.04
1975	10,700	8,800	20,128	233.95	5.86
1976	10,700	8,700	17,947	267.16	6.52
1977	10,600	8,700	17,863	294.24	7.27
1978	10,300	8,500	17,778	322.24	7.92
1979	9,200	7,400	18,121	330.43	8.11
1980	7,800	6,100	n.a.	34,835	8.65

¹ November data.

² Hourly employees only.

Source: Statistics Canada, Employment, Earnings and Hours, Cat. No. 72-002.

NOTES

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